JOURNAL of FORESTRY

February
1937

Vol. 35 Number 2

(PROCEEDINGS NUMBER
36TH ANNUAL MEETING)

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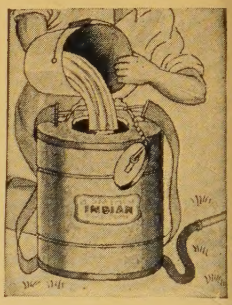

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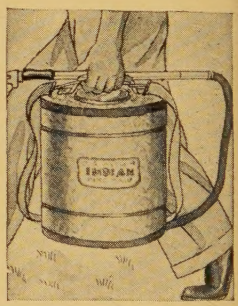

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JOURNAL of FORESTRY

OFFICIAL ORGAN OF THE SOCIETY OF AMERICAN FORESTERS
A professional journal devoted to all branches of forestry

Entered as second-class matter at the post-office at Washington, D. C. Published monthly.

Acceptance for mailing at special rate of postage provided for in the Act of February 28, 1925, embodied in paragraph 4, Section 412, P. L. and R. authorized November 10, 1927.

Office of Publication, Mills Bldg., 17th and Pennsylvania Ave., N. W., Washington, D. C.

Editorial Office, Mills Bldg., 17th and Pennsylvania Ave., N. W., Washington, D. C.—Manuscripts intended for publication should be sent to Society's headquarters, at this address, or to any member of the Editorial Staff. Closing date for copy, first of month preceding date of issue.

The pages of the JOURNAL are open to members and non-members of the Society.

Missing numbers will be replaced without charge, provided claim is made within thirty days after date of the following issue.

Subscriptions, advertising, and other business matters should be sent to the JOURNAL OF FORESTRY, Mills Bldg., 17th and Pennsylvania Ave., N. W., Washington, D. C.

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JOURNAL OF FORESTRY

VOL. 35 FEBRUARY, 1937 No. 2

PROCEEDINGS OF THE 36th ANNUAL MEETING OF THE SOCIETY OF AMERICAN FORESTERS

MULTNOMAH HOTEL, PORTLAND, OREGON DECEMBER 14-15-16, 1936

FOREWORD

IN accordance with custom, the present issue of the JOURNAL is given over entirely to the Proceedings of the recent Annual Meeting of the Society. The report covers only the open sessions; the executive session record is in S. A. F. AFFAIRS for January.

The registered attendance of 488 somewhat exceeded that of the year before at Atlanta, and far exceeded any earlier registration. The actual attendance was doubtless well over 500. This banner record may have been helped by the fact that the Western Forestry and Conservation Association meeting had immediately preceded. The Association meeting is always largely attended by Pacific Coast and Northern Rocky Mountain industrial representatives; and the Society meeting probably derived some of its enrollment from those assembled for the earlier event.

It derived some of its color from the same source. The question of public acquisition policies had been brought forward and warmly discussed at the Association meeting, where a substantial amount of uneasiness on the part of the industrialists and their associates over increased federal ownership had come to the surface. Also involved was the question of state as against federal ownership programs. The cross currents of opinion engendered by the Western Forestry and Conservation Association discussions continued to run at the Society meeting.

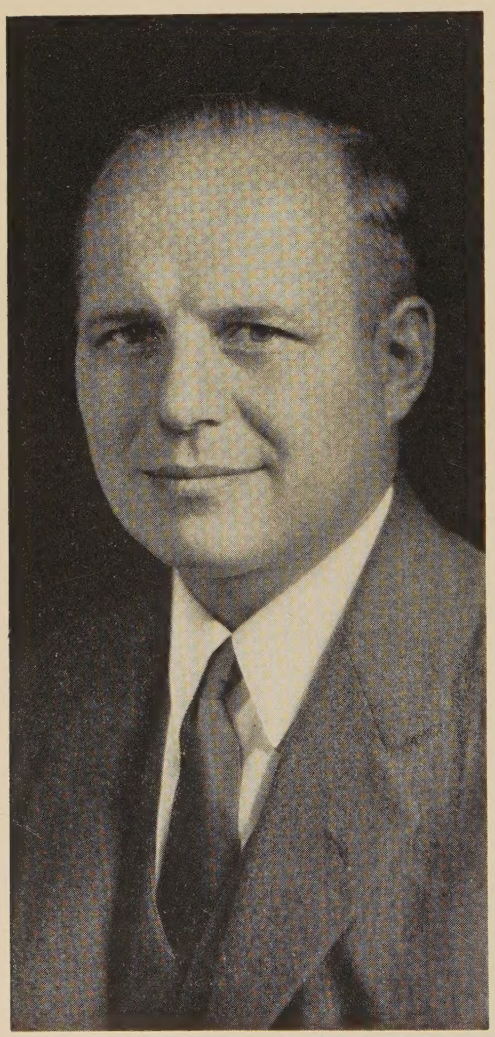
As hosts, the Columbia River and Puget Sound Sections of the Society joined forces. The local arrangements and entertainment provided set a high-water mark. Every detail was looked after with extraordinary efficiency; western hospitality did itself proud; and a rich choice of highly interesting field trips was offered as a wind-up. Those privileged to attend the Thirty-sixth Annual Meeting will long remember with grateful appreciation what was done for them by the members of the entertaining Sections, collectively and individually.

The Program Committee Chairman was Thornton T. Munger. The Committee on Local Arrangements was headed by J. F. Kummel. His associates and subcommittee chairmen were: C. S. Cowan, banquet program; I. J. Mason, hospitality (including women's entertainment) and registration; C. O. Lindh, field trips;

H. J. Andrews, hotel arrangements and railroad transportation; and George E. Griffith, publicity.

Henry Schmitz, Editor-in-Chief

At the executive session Tuesday morning, the present Editor-in-Chief of the Journal made it known to the Society that his early resignation must be expected. Of this the Council had already been informed; and action looking to the selection of another Editor-in-Chief was promptly initiated. The appointment of Dr. Henry Schmitz, by vote of the Council, has since been made and accepted. The Society may well be felicitated on this outcome.



Henry Schmitz

Henry Schmitz received his early education in his native city of Seattle, graduating from the University of Washington with the degree of B.S. (For.) in 1915 and receiving the M.S. degree one year later. His appointment to a fellowship in the Henry Shaw School of Botany, Washington University (St. Louis) followed. War service as an ensign in the U. S. Navy (submarine chaser and transport service) from June 1917 to January 1919 interrupted his studies on this fellowship; returning to it, he received his Ph.D. degree in 1919.

From 1919 to 1925 he was successively instructor in forestry, assistant professor, associate professor, and professor at the University of Idaho; and in July 1925 he was appointed to his present position of Professor and Chief, Division of Forestry, University of Minnesota. He was elected a Junior member of the Society of American Foresters in 1921 and a Senior member in 1923, and has served on the editorial board of the Journal since 1931.

He is a member also of the Botanical Society of America, the American Phytopathological Society, the American Wood Preservers Association, the American Railway Engineering Association, and the American Association for the Advancement of Science. His bibliography is extensive and relates principally to the subjects of wood decay, wood preservation, forest pathology, and forestry education.

Dr. Schmitz will assume charge beginning with the April Journal. Contributions should no longer be sent to the Washington office of the Society but should be submitted directly to Dr. Schmitz or to an Associate Editor.

MONDAY MORNING SESSION, DECEMBER 14, 1936

I. Opening Session and Presidential Address

Chairman: Clyde S. Martin

THE opening session was called to order by Clyde S. Martin, Chairman of the Columbia River Section of the Society. He said:

The Columbia River Section of the Society feels it both an honor and a privilege to be host to the foresters of the country at this time. In the Pacific Northwest we have very definite problems. They are of national importance, because they concern more than half of the commercial standing timber in the United States. We wish first that all of you have a real understanding of them; secondly, we need your counsel with respect to them.

We have very little time, so I am not going to take any more of it. Your President, Prof. H. H. Chapman, will give the opening address.

President Chapman then read the following paper:

A COMPARISON OF BRITISH AND AMERICAN FORESTRY PROBLEMS

By H. H. CHAPMAN

President, Society of American Foresters

THE physical difference between forestry conditions in Great Britain and the United States is striking. Contrasted with our area of over 500 million acres of commercial forest lands, or about 4 acres per person, the woodlands of England, Wales, and Scotland, for a population of about 45 millions, are but 3 million acres, or 0.07 acre per inhabitant. For our wealth of species of commercial importance, numbering some 182, the native trees in England are confined to two species of white oak, beech maple (called sycamore), ash, white birch, elms, poplars, and willows, and for conifers the Scots pine, native to Scotland; or approximately one-tenth of our number.

Furthermore, the area naturally adapted to forests is surprisingly limited. Due to excess moisture and low temperatures and the formation of peat, trees are not successfully grown at elevations of over 1,000 feet, and not only are most of the mountains naturally bare of forest but also great stretches of moors and downs at lower elevations, which are grassy or covered with heather and bracken, even in the south of England. Most of the lowlands were covered with forest or swamp at the time of the Roman invasion, but centuries of clearing and intensive cultivation, accompanied by a dominant interest in sheep grazing on the higher lands, have resulted in the practical extermination of the native forests of Great Britain, forcing the nation to depend on imports even for the barest necessities of wood utilization.

Silvicultural Practice

The result of these conditions has produced a type of forestry which is based almost entirely on a system of planting and clear cutting, modified by a few examples of coppice with standards of oak. By and large, the oak is of poor quality for lumber, with short boles, and while

tough and productive of ship knees, is on the whole not very profitable.

Conifers offer better prospects of financial returns, but the Scots pine, while producing native stands of superior quality in certain districts of Scotland, falls a victim, as it did in Germany, to the shortsighted policy of indiscriminate use of seed from poor continental stocks; and much of it is limby and crooked as a consequence. Furthermore, while better adapted to poor sites than imported conifers, its growth is far inferior to European larch, Norway and Sitka spruce, and Douglas fir, which are being widely used in modern operations.

Even when confined to favorable altitudes and soils, the establishment of coniferous or hardwood plantations suffers from two formidable handicaps. The first is the competition of luxuriant undergrowth and of moor vegetation, which requires the use of strong transplants, and of cultural operations including drainage of moor lands. The second is even more impressive, the protection required against rabbits. So serious is this rabbit scourge that plantations are completely destroyed unless surrounded by vermin-proof netting buried in the ground. This expense plus the cultural operations required raises the average cost per acre for planting to about $50 as compared to our figures, running from $3 to $15 per acre.

Natural reproduction from seed is likewise rendered impossible except under fence, and its occurrence even then only follows occasionally when forest conditions, followed by cutting, produce a favorable seedbed. Thus it happens, for the most part, that when a woods is cut over no attempt is made to reproduce it except by replanting the area at much the same cost as before. Contrast this with the comparative ease with which natural reproduction takes place over most of our forest areas if given even the rudiments of proper management.

Marketing

The factor which makes any forestry possible under these circumstances is the possibility of home markets for wood products. A system of paved roads makes every woodlot accessible. The consumption of timber in the mines is enormous, and there exist markets for many other products, such as hop poles from coppice, and fuelwood. The difficulty encountered in developing dependable markets for wood in England lies principally in the insufficient supply of home-grown timber. The large users learn to depend upon imports, which they can rely on, and discriminate against the uncertain and meager supplies obtainable from home sources. To overcome this difficulty, a marketing association has been formed for the purpose of developing outlets for local forest products. The theory of scarcity does not redound to the benefit of British forestry. Here again we may profit by their experience by recognizing that if wood is to maintain its economic position, more and not less should be grown in regions of large markets.

Private Forestry

Up to the advent of the plan for acquiring and reforesting 1,770,000 acres of land by the British Forestry Commission for purposes of national defense, practically all forestry was in the hands of owners of large estates in England and Scotland. These owners went in for a certain amount of forestry, partly as a hobby and partly for the revenue to be derived from woodlands. In a few cases, especially in Scotland, a private forest would be built up by planting to an area of several thousand acres, and on the best managed of these estates excellent stands of conifers and hardwoods were grown. Elsewhere private forests were almost nonexistent. The farmers' woodlots, which comprise so great and important an element in our forests, scarcely exist in Great Britain.

Taxes

Stability of land tenure and surplus income account for existing private forestry in that country, just as in America its greatest obstacle lies in the insecurity and transient character of land holdings acquired for the purpose of exploiting the original stands. But as an illustration of the fact that economic factors are no respecters of national boundaries, the forests on many of these private estates appear to be doomed to destruction because of taxes. In this case it is not the annual or property tax which works the mischief. The system of taxation in England is based for the most part on income, or earning capacity of the land, and not upon sale values or speculation, so that farm lands adjoining large cities are still taxed on a farm income basis, while forests receive special consideration. American forest owners would consider the British system of forest taxation as ideal compared with the crushing weight of property taxes imposed on cut-over lands which prevents all private enterprise in reforestation over wide regions.

In Great Britain the shoe pinches in a different place, and that is the death taxes. This capital tax reaches very high rates, even 50 per cent on very large estates. Unless an estate owner has large financial resources other than in land, a single death may lead to the sale and dismemberment of the estate, and two deaths at short intervals is almost sure to do so. When this happens, the woodland is purchased by timber merchants, clear-cut in the usual manner, and no attempt is made to replant the area. The destruction of forests from this cause, i.e., the impoverishment of the owners of large estates, is said to be responsible for losses in forest area which exceed the areas planted by the Forestry Commission.

Regulation of Private Owners

Public sentiment looking to the prevention of forest denudation by private owners is nonexistent. The British public is on the whole neither informed nor interested in forestry as a national movement, except for the attention that the operations of the Forestry Commission have attracted. Regulations would be fraught with immense difficulties as an invasion of private rights, and as requiring an involuntary initial outlay running to high figures for artificial reforestation. In this field America has made greater advances, but largely in fire prevention. The British have practically no fire hazard, due to their climate and to the small isolated and protected character of their forests, most of which are behind ancient stone walls and rigidly guarded against trespass. In this field we stand midway between the British and the continental countries, which have progressed rapidly of late in practical measures for regulation of private forestry.

Public Interest

The British public are confirmed walkers and cyclists. Three million bicycles, at least a tenth of which are tandems propelled by couples, with the girl always behind, enable a large fraction of the people to enjoy the country side, which is worth the effort. The appreciation of beauty is well developed. But for some strange reason the British like their scenery as it is, which for the most part means treeless slopes, open moors, and wide unbroken views. In the Lake country, the Mecca of most nature lovers, this sentiment is so strong that when the Forestry Commission acquired and started to plant certain slopes and hillsides, a well organized propaganda was started to prevent this desecration of the region made famous by various poets; and the Commission being without any publicity bureau, and unsupported by such agencies as our American Forestry Association, was forced to capitulate and

agree to withdraw from an area of 300 square miles. Similar organized protests met their attempts to plant on Dartmoor in Devon.

In comparing this phenomenon with the various park movements in the United States, and those for the creation of wilderness areas, we can realize that this innate, emotional desire to keep man from exercising any sort of control or management of natural areas is to be reckoned with as a primitive force not subject to the arguments of economic need. To the British vacationer, his barren hills are more important than the production of timber for indispensable national needs in case of war. To the American park enthusiast, the idea of vast unbroken and impenetrable stretches of virgin timber into which he can see less than a hundred feet fills him with enthusiasm which no amount of reasonable argument in favor of a sane program of classification and use of such areas seems to affect in the slightest. Britain, however, does not have a national service devoted to the extension of park areas. This important work is managed by a private association which is acquiring beauty spots and reserving them for public access and use.

Game Management

No one who has not visited Great Britain can realize the tremendous importance of feathered game as an item of sport. The treeless condition of the moors is compensated for by the fact that the heather is the natural food of grouse, which are managed on a sustained-yield principle by the owners of these lands. Forestry will never conflict with this industry, since the best moors are usually above the timber line of profitable tree growth. More serious is the problem of the English pheasant, which is a woods bird for the most part. On practically all estates with woods the raising and shooting of pheasants is far more important than the tree crops. As a consequence a ruthless campaign is waged against weasels and stoats, which are the natural enemies of the rabbit. Foxes are protected and then hunted for sport, and are not numerous. It is very probable that this reduction of vermin may be the direct cause of the rabbit plague, which, since the price of rabbit meat fell below the margin of profit due to Australian imports, has assumed the proportions of a national menace. Destruction of agricultural crops and great inroads on pastures (at the rate of 10 rabbits equals one sheep) are now added to the permanently high cost of fencing plantations and failure of natural seeding. Here again we may profit from British experience and endeavor to base our game management on the principle of a balanced fauna in which predators play their part.

Public Forestry

The program of acquiring and planting 1,770,000 acres of land for the growing of timber for national requirements seems small in comparison with our public holdings, now approaching 200,000,000 acres, but, as here, these public forests mark the first permanent interest of the entire people in forestry. Already the benefits in furnishing increased employment are recognized by a program for forest workers' homesteads, which has served to keep up the appropriations in the face of terrific governmental budgets and huge tax burdens. The comparison with our C.C.C. program is obvious.

Administration

British administration of public affairs, both national and civic, presents an enviable goal for us to shoot at. The British demand and obtain a high grade of efficiency in all public enterprises, including forestry. They secure this through the enforcement of the merit system, based

on Civil Service. Political parties come and go, and the policies of the government are molded and changed in obedience to the popular will, but the idea that trained public servants are unfit and incapable of carrying out these policies unless they belong to the party in power is recognized not merely as a fallacy but as a dangerous, vicious, and impossible doctrine, which they will have none of. Consequently all public administration is in the hands of those who are best able to conduct it efficiently and economically. The nation has no wealth to squander on incapable political employees. Their enterprises, such as the colossal government-subsidized building program for slum clearance, are carefully worked out beforehand in all their aspects, economic and financial, and are amended as experience points the way for improvement. The time is rapidly approaching in America when our citizens will have to decide between the spoils system and bankruptcy on the one hand, and the conservation of our resources through a similar establishment of merit and efficiency in all of our public enterprises. Perhaps this is the most important lesson which British practice offers for our consideration.

II. Presentation and Discussion of Papers

Subject: Who Shall Own the Forests of the Pacific Slope?

Chairman: W. B. Greeley

Chairman Greeley: Fellow foresters, with all of the different angles, complications, and possible overlappings which enter into this question of forest acquisition, the situation reminds me a little of the time when the forestry section of the American Army in France was inspected by the General Inspector from American Headquarters.

The General Inspector was an old cavalry colonel—you could see that from his bow-legs. He was particularly concerned in trying to find out why the American Army needed so much lumber, and so many different kinds of lumber. He went over with me meticulously, line by line, just what we were doing here and just what we were doing there, what the dock requirements were, what the cantonments required, and so on. Finally I showed him an order we had just received from the Quartermaster General, instructing us to install machinery to make excelsior wherewith to stuff the mattresses of the dough-boys. That was the last straw. The General Inspector from American Headquarters jammed on his campaign hat, stuck his cigar at a sharp upward angle, and walked out of the room. At the door, he turned and gave me his parting shot. "Major, all I have to say to you is that waging a war these days is a hell of a complicated proposition."

Perhaps that may not accurately describe the situation in respect to this question, "Who shall own the forests of the Pacific slope?" Yet with all that we hear of the Fulmer act, of resettlement acquisition, of what is to be done with the tax lands, of the Forest Service program, the National Park Service program, and so on, the every-day business man does begin to find himself a little confused at times. So I think this is an admirable subject for discussion by the Society. While I do not wish to steal anyone's thunder, I do want to say from the standpoint of one important business group in the Pacific Northwest, the lumber industry, a thing we much desire is a clarification of the national policy of acquisition, through whatever channels or agencies that acquisition may be carried on. We also greatly desire a coordination

of the forest acquisition plans of the federal government with those of the states of the Pacific Northwest. We feel that both are properly in the picture, and that the more closely their acquisition plans can be coordinated and developed mutually, so each will support the other, the greater will be the gain all around.

The chair then called for presentation of the following report and papers.

REPORT OF THE COMMITTEE ON PUBLIC ACQUISITION OF FOREST LANDS

THE Committee on Public Acquisition of Forest Lands was appointed in the spring of 1935. A report was made at the Atlanta meeting in January 1936. The members present at this meeting voted to submit the report to the Council for action. During the summer of 1936 the Council was requested by President Chapman to consider the recommendations contained in the original report. For convenience of reference, the original recommendations are restated herein. The report was published in full in the March JOURNAL, and the Council's criticisms in the September issue of S. A. F. AFFAIRS.

ORIGINAL RECOMMENDATIONS

1. That measures be instituted for the effective coordination or centralization of public land acquisition programs, whatsoever the agencies and their purposes may be, and that definite statements of policies and objectives be made public.

2. That the objectives and needs of the separate agencies be given consideration in any immediate program, as well as in the ultimate plan.

3. That following an extensive survey of those portions of the country where the need of public land acquisition is indicated, intensive surveys or land classification programs be made in order that there may be adequate and accurate information available for sound planning.

4. That until such time as these studies are made available, public acquisition by all agencies proceed only at a moderate rate. The Committee wishes to emphasize that present knowledge and experience is inadequate to permit of the planning or the execution of plans involving sweeping economic and social changes within a short period of years. Furthermore, the Committee wishes to suggest that the rapid economic changes in the past and the many errors in public judgment dictate the necessity for careful and measured procedure, in contradistinction to hasty and unstudied action.

5. That all public agencies charged with the acquisition and administration of forest lands or the development of wild lands renew and amplify their efforts to obtain the ends desired through private forest land management. There is a direct connection between federal cooperation in state forest acquisition and assistance to the private landowners.

6. That we recognize need of early action in the purchase of 90 billion feet in the West. The Committee realizes that the public acquisition of sufficient of the remaining virgin timber on the West Coast to stabilize the lumber industry of that and other affected regions is a possible solution to a serious economic problem. It is, however, inclined to believe that this problem is one separate and distinct from the general problems of public acquisition and administration. It is somewhat apprehensive that the entire issue of public land acquisition and administration may become somewhat confused if strong representations are made to include this proposition as a part of the general public land ownership program, and suggests that it be distinctly and separately considered.

Action by the Council

Certain objections were made by various members of the Council to parts of the recommendations. Two members disapproved of the entire report, but a substantial majority approved the recommendations with the following amendments:

Recommendation 1 was revised to read as follows:

"That measures be instituted through the National Resources Committee and the various State Planning Boards for the effective coordination or centralization of public land acquisition programs, whatever the agencies and their purposes may be, and that definite statements of policies and objectives be made public."

This revision adds the words: "through the National Resources Committee and the various State Planning Boards."

Recommendation 2 was approved by the Council.

Recommendation 3 was approved by the Council.

Recommendation 4 was amended to read as follows:

"That until such time as these facts are available, public acquisition by agencies proceed only at a moderate rate, and that studies be made of the best means of meeting such economic and social problems as may be created by an expanded program of public acquisition of forest lands."

Recommendation 5. The Council approved the first sentence and disapproved the last sentence of this recommendation. It now reads:

"That all public agencies charged with the acquisition and administration of forest lands or the development of wild lands renew and amplify their efforts to obtain the ends desired through private forest land management."

Recommendation 6 was disapproved by the Council.

Subsequent Action by the Committee

Following the Council's action, President Chapman requested the Committee to proceed with further study of this question, taking up any points which seem to be of importance at the present time. The Committee was canvassed by its chairman, who first submitted to the members thereof the results of the action by the Council. From their replies it was evident the Committee as a whole felt that only a few significant facts had come to light during the present year. The data obtained tended to prove the soundness of the recommendations which the Committee had made. There still is a good deal of uncoordinated acquisition work being carried on by several governmental agencies. While the Committee believes it is not necessary to specify all of the numerous instances demonstrating lack of coordination which have come to its attention, two are cited as examples of ill-considered action.

In one section of the South a purchase unit, carefully considered by one agency, was turned down because of the high cost of land; subsequently a different governmental agency examined the land and later purchased it at a figure much higher than that at which it had been offered to the first agency. The number of acres and the amount of money involved were large. This fact in itself might not be so objectionable, perhaps, if the results to be accomplished by the second agency were to be substantially different from those which would have been obtained under the administrative policies of the first agency. Such is not the case, however. It is reported that the second agency plans to administer the lands with precisely the same objectives in mind that the original agency set up for itself.

In another case, a governmental agency established a purchase unit in one of the Central States and made substantial purchases therein. But now, having had a

little time to consider the situation, the need for public ownership of this particular purchase unit is less evident, and it is admitted that the establishment thereof was both hasty and unwise.

After having had the benefit of criticisms from the Council and others, the Committee has endeavored to modify some of the recommendations for the purpose of clarifying their meaning.

Recommendation 3, accordingly, although approved by the Council, has been further revised by the Committee to read as follows:

"That the U. S. Forest Survey or equivalent fact-finding agencies extend their activities as rapidly as possible to cover completely those portions of the country where public land acquisition is contemplated or the need therefor is indicated, thereby making available to the Planning Boards definite and accurate information as a basis for sound planning."

Recommendation 4, which was revised by the Council, has been further modified by the Council to read as follows:

"That so far as expedient, the effort be made to proportion the rate of acquisition by all agencies to the basis of facts thus provided. (See 3 above). The Committee, on the basis of present limited knowledge and experience, objects to acquisition procedure based upon plans implying the acceptance of the need of sweeping economic and social changes unless the facts that are obtained by fact-finding agencies justify it."

Except for these two amendments, the Committee is willing to accept what the Council has heretofore approved. It does not wish to make further recommendations with reference to the purchase of timber on the West Coast.

As an explanatory comment, it may be stated that the Committee does not desire the language of its recommendations to carry the implication that acquisition should not go forward while the assembling of desirable data by fact-finding agencies is progressing. It has used the word "moderate" without attempting to define its meaning. This ambiguity has been commented upon in the criticisms of the first report. The Committee could not well attempt to set up any figures, either as to acreage or as to the funds required. What it really felt should be done was to point out with emphasis that the various acquisition agencies should be more certain of their policies and objectives than has been apparent during the emergency period; indeed, the Committee feels that since national recovery is well under way and efforts are being made to effect better coordination of land-purchasing agencies, the progress of acquisition, even though vigorously prosecuted, will be only "moderate".

Personnel of the Committee

W. J. Damtoft, Assistant Secretary, Champion Fibre Company, Canton, N. C.

Prof. Shirley Allen, University of Michigan, Ann Arbor, Mich.

I. F. Eldredge, Director of Surveys, Southern Forest Experiment Station, New Orleans, La.

J. S. Holmes, State Forester, Department of Conservation, Raleigh, N. C.

L. L. Bishop, Forest Supervisor, U. S. Forest Service, Houston, Texas.

Karl Swenning, Forester, Mead Corporation, Kingsport, Tenn.

A. C. Shaw, Assistant Regional Forester, U. S. Forest Service, Atlanta, Ga.

H. A. Smith, State Forester, Columbia, S. C.

Dr. J. V. Hofmann, Dean of Forestry, A. and M. College, Raleigh, N. C.

Dr. C. F. Korstian, Director, Duke Forest, Duke University, Durham, N. C.

E. H. Frothingham, Silviculturist, Appalachian Forest Experiment Station, Asheville, N. C.

G. R. Phillips, State Forester, Oklahoma City, Okla.

Verne Rhoades, *Chairman*, Asheville, N. C.

PRESENT TRENDS IN PRIVATE FOREST OWNERSHIP

By DAVID T. MASON

IN dealing with this subject I shall indicate and follow the outline of subheadings recommended by the Program Committee.

Attitude of Private Forest Owners

The attitude of the private forest owner depends mainly upon (a) his own and the general experience of which he has knowledge in forest ownership; (b) his present circumstances; and (c) his natural personal inclination.

The important period of private acquisition of timber in the West ended about 30 years ago, about 1907. Much of the present privately owned forest land is in the same ownership as in 1907. The private timber was, of course, bought with the expectation of securing a profit either from selling timber still standing or through mill operations, although, especially in later years, some timber has been bought to maintain unprofitable operations with hopes of a turn for the better sometime later on. Timber owners were encouraged to buy by the general expectation of timber famine in the earlier years of this century. The private owners experienced rapid value appreciation in the period from 1897 to 1907, then a standstill of values from 1907 to 1917, then another period of less rapid value increase from 1917 to about 1927, and during the past 10 years a period of declining values. Thus we see in the matter of prospective income a transition during the past 40 years from early rapid value increases to substantial declines during the past few years.

On the other hand, in the matter of carrying costs, we see items with their seriously depressing effect upon the actual or prospective owner's inclination for timber ownership. Computed interest on the original investment in the case of properties not burdened by debt has been mildly effective in convincing owners that their investment is not as good as they expected it to be, but after all the optimism of the average owner has encouraged him to continue the ownership; on the other hand, in the case of properties burdened by debt, interest actually payable has proven a tremendous burden and has quite frequently caused properties to change hands, with of course loss to the original investor. The tax burden, as affecting the owner's attitude, has been even more important than the matter of interest; taxes have increased greatly during the past 40 years, but have declined moderately in the last few years. Fire has, on the average, caused comparatively little loss, although extremely heavy in some individual cases; however, the fear of fire has had its effect. Insect losses, especially in pine, during the past few years have been heavy in many places. The white pine blister rust is a serious threat.

All together, these cost factors have brought the private forest owners to a decidedly pessimistic point of view at the present time. However, those who have not fallen by the wayside still have their timber, are hoping for better days in the future, are doing their best to hang on, but with a strong inclination to sell if a moderate price is obtainable. Most of these owners are timber owners rather than forest owners; there is an inclination of timber owners to become and remain forest owners if the public will do its part in making private forest ownership practicable.

Rate at Which Forest Land Is Passing from Private to Public Ownership

The largest transfers from private to public forest ownership during the past generation have resulted from the revesting in 1912 of the O & C grant, with about 2.5 million acres of forest land carrying about 45 billion feet of timber, and in 1929 the revesting of about 1.7 million acres of the Northern Pacific grant. Some of the most important public purchases in recent years have been for park purposes in California. The State Park System there has bought substantially over a billion feet of fine timber in the redwood region. Several hundred million feet of fine sugar pine and associated species have been purchased for addition to Yosemite National Park. Much smaller transfers from private to public ownership for park purposes have taken place in other western states.

The Forest Service has taken over substantial areas of private forest land mainly through the exchange features of its legislation. By this means the National Forests have acquired up to date in Oregon and Washington approximately 400,000 acres, mainly cut-over land; this is approximately 2 per cent of the private forest area in these states. Probably in proportion to the area of private forest land in the other western states the percentage acquired, especially of cut-over lands, has been about the same. In Oregon and Washington by donations the Forest Service has acquired approximately 8,000 acres of private forest land, largely cut-over. Substantially greater areas have been received in this way by the Forest Service in other states, especially in Idaho. For the first time in the West in any substantial way, the National Forest Reservation Commission purchase funds are being used this year to acquire approximately 7,000 acres of old-growth timberland in the Mary's Peak area in Oregon.

The Resettlement Administration has taken over several hundred thousand acres of low-value forest land, mainly in northeastern Washington, much of this being tax delinquent land acquired from the counties.

The most important way in which private forest land is now passing to public ownership in the West is through the tax delinquency and foreclosure route; by this means in certain counties in western Oregon approximately 16 per cent of the private forest land area has passed from private into county ownership. The acreage thus county-owned has considerably more than doubled since 1932. This tax-foreclosed land is roughly about one-third each (a) cut-over land, (b) well developed second growth, and (c) timber averaging over 20 inches in diameter.

The foreclosed area would be much greater were it not for virtual moratoriums on foreclosure in some counties. The data given are probably representative for the remainder of western Oregon and in a measure for western Washington also. In Washington a wise law has been enacted to provide for the state taking over from counties for forest management tax-foreclosed forest land. It is understood that something over 400,000 acres are in process of passing from county to state management under this Washington act.

Trend Toward Consolidation of Forest Properties or Otherwise

The period prior to 1907 was one during which acquisition and consolidation of private forests were going on most rapidly. Many large properties were put together during this period. In 1920 the timber section of the Bureau of Internal Revenue, from a large amount of reliable data, supplied information published in the Capper report of 1920. These data

show that for the period 1913 to 1918 inclusive private forest-land ownership in large individual properties in the West on the average was practically at a standstill. During the period from 1918 to about 1925 there were several notable developments of new operations with large timber properties involved, as the result of investment of fresh capital, coming mainly from the southern pine region. Many of these investments made in this prosperous period have since turned out badly.

During the past 10 years there has been comparatively little consolidation of private forest properties, although strong efforts have been made in some important parts of the West. The most notable consolidation is one in north Idaho. There is, on the whole, more tendency for existing ownerships to merge than for a particular property to grow by purchase of other properties. A sign of the times is the increasing practice of large timber owners to sell timber to be paid for as cut rather than to sell substantial properties outright; this is not because the large owners do not wish to sell outright, but rather because the buyers are willing or able to pay for only a comparatively small quantity at a time. There has been a very little buying by owners who hope to develop sustained-yield units. Most buying is hand to mouth.

In Oregon and Washington about 6 million acres, or about 25 per cent, of the private forest land consists of farm woodland; during the past 25 years the area of this class of forest land has increased 50 per cent, while at the same time the total area of farm ownership increased only 37 per cent.

Desirable Goal as to Amount of Private Forest Ownership

Since 1907, as we have seen, the trend has been away from private forest ownership. There appears, however, to be a broadly held opinion that in the solution of our forest problem there should be reliance to the maximum extent practicable upon private ownership, management, and operation of forest land, with public action to the extent necessary

(a) to remove unreasonable economic obstacles and to create reasonably favorable conditions for private forest ownership and management;

(b) to acquire forest land of such character and location as to contribute effectively to the development of "cooperative sustained-yield units"; and

(c) to acquire forest lands of such character as to be impracticable for private ownership and management.

Careful coordination of acquisition work is essential for satisfactory results. The private owners should be encouraged to do as much as practicable. Of that which the private owners cannot do, the state should do all that it can. The federal government should do what cannot be done by the other two. It is impossible to predict now what should be or will ultimately be the ownership proportion of each, for at best a number of years are required for the working out of this policy, and during that time there will be substantial changes in economic conditions and in the mental attitude of private forest owners. Let the public promptly remove the obstacles to private forest management, let the states and the federal government move ahead promptly under the forest acquisition policy suggested, and let all continue this policy until forest ownership has become stabilized. It is useless to predict how such a policy would work out as to ultimate proportions of private, state, and federal ownership, but it is believed that the policy is sound and should be promptly and energetically applied.

FOREST LAND ACQUISITION AND PROCEDURE

By T. S. GOODYEAR

State Forester of Washington

BEFORE entering on my subject, let me call attention to the fact that it is confined to the states of the Pacific slope. Before I get through, some may think I am against the National Forests. I want to state very plainly that I am absolutely in sympathy with the National Forests. I think they are essential; but in the Pacific Coast states, in some of which the government has more than 50 per cent already of the entire forest land, of which over 60 per cent bears merchantable timber, I think they have enough. The following figures from the Regional Planning Council were published about two weeks ago. The states of Idaho, Montana, Oregon, and Washington contain 796 billion board feet of saw-timber, or 48 per cent of the entire saw-timber in the United States, and 55 per cent of the softwood saw-timber. In these four states at present 52 per cent of the timber is federally owned or managed; 43 per cent is in private ownership; and just 5 per cent is owned by the states, counties, and municipalities. The fact that the states, counties, and municipalities only own 5 per cent of the entire timber stand in these states makes it necessary to touch on the subject of federal acquisition, and also on private industry.

At present there are three systems of managing cut-over forest lands: first, retention and development by individual or corporate effort; second, state acquisition; third, federal acquisition. The first system is by far the most preferable.

Future forestry and timber problems cannot be entirely solved by extensive federal and state land acquisition. Public ownership and administration of the natural resources will eventually aggravate rather than settle the complex forest-land problems. One of the commonly used arguments for federal forest-land acquisition is the citation of efficient management of government-owned timber lands in European countries. It must be remembered that foreign governments were based not only on governmental or crown ownership but also upon operation and management of the natural resources, while our Constitution not only encourages but also guarantees protection to private ownership and enterprise. The United States government is largely dependent upon private capital and enterprise for the development of its natural resources, and its security is directly in proportion to the prosperity and solidity of these industries. Rather than a concentrated program to take away from private ownership the forest lands in the various states, it is suggested that governmental agencies—federal, state, and county—combine their efforts to encourage the development of forest resources by individual capital and effort, thereby assuring one permanent source of revenue for support of the various necessary governmental departments.

Another argument for support of the vast proposed federal land-acquisition program is the return to county school and road funds of 25 per cent of the net receipts derived from National Forest timber sales and grazing leases. This sounds attractive, but let us consider for a moment just how it actually works out for the average taxpayer. In 1906 the National Forests were established in the state of Washington. They include a net area of 9,624,918 acres, of which approximately 5,841,000 acres are covered with some form of commercial timber.

According to a recent statement by the Forest Service, the distribution to counties of the 25 per cent road and school fund derived from National Forest receipts, from 1906 to 1935 inclusive, totals $2,039,613.15. The tax commission recently computed an assessed valuation of government-owned timber within the National Forests of Washington which amounts to approximately $33,000,000. In arriving at this valuation it was necessary to make allowances for inaccessibility and lower grades of timber on the higher elevations. Consequently only about 50 per cent of the valuation against privately owned timber in surrounding areas was applied to timber within the National Forests. The average levy against privately owned timber comparable in grade with that in the National Forests is 29 mills, which on $33,000,000 would net $957,000 annually in taxes. In private ownership this same timber during a thirty-year period would have brought in taxes amounting to $28,710,000, while the National Forests during the past thirty years have returned to the counties of Washington but $2,039,613.15. Perhaps this is a logical argument for extension and establishment of National Forests.

Timberlands owned and administered by public agencies are not managed as efficiently or economically as by individual or corporate effort. Forest lands in private ownership, with some encouragement from public agencies along the lines of equitable taxation, may become self-supporting and return a fair profit to the owner, while it is questionable if public-owned forests may ever be operated on a self-supporting basis.

Representatives of the industry and forest-land owners, let me remind you that when your cut-over lands are sold, exchanged, or given to the government, state, or counties you merely transfer the control and management of these lands to a more extravagant agency. You continue to pay the bills, in more ways than one: first, by direct taxation, and again through the additional burden placed against lands that remain in private ownership. Possibly these added taxes might suffice to carry at least a part of your lands and give you the satisfaction of keeping them under your own direct control. Exemption from general taxation of lands used for production of timber until such time as the timber has a merchantable value, a deferred or yield tax against timber when it is harvested, and a reduction in annual valuation of cut-over lands for taxation purposes are some of the first important and necessary steps to encourage the retention of these lands in private ownership and the practice of private forestry.

We all realize, probably better than ever before, how quickly people are willing to accept government relief and how soon they become dependent upon the government to take care of them. This is also applicable to the cut-over land problem. When people generally, as well as the industry, realize that public agencies will eventually take over their lands, they soon lose the resourcefulness and initiative to make proper local provisions by which it may be made practical to retain these lands in private ownership. The line of least resistance is to give up the ship and become resigned to the fact that government or state will solve our local land problems. Land-acquisition policies should be determined under normal conditions rather than during times of depression and economic stress, when unpaid taxes against real estate accumulate and land values decline. After it has been definitely determined that it is both impractical and impossible for private industry to retain and develop cut-over forest lands, provision should be made for the states to select, acquire, and administer a large percentage of these lands.

A state land-acquisition program is dependent entirely upon public sentiment and the amount of support that may be given by state legislatures in the form of appropriations to carry on such a program.

There are several practical methods by which the states may acquire forest lands: first, by outright purchase from appropriations that may be made for that purpose; second, by gifts from individuals and corporations or from counties that may have acquired title to lands through delinquent tax foreclosures. Individuals, as well as counties, seem rather reluctant to part with land so long as there may be some value attached to it, either on the surface or under the ground. Consequently a very small percentage of land may be acquired by gift.

In the state of Washington there is a statute that provides: "If any lands heretofore acquired, or which may hereafter be acquired, by any county through foreclosure of tax liens, or otherwise, come within the classification of lands described in section 3 of chapter 154 of the Laws of 1923, which can be used as state forest lands and if the state forest board deems such lands necessary for the purposes of this act, the counties shall, upon demand by the state forest board, deed such lands to the said board and said lands shall become a part of the state forest lands. Such lands shall be held in trust and administered and protected by the said board under the provisions of chapter 154, Laws of 1923, or any amendments thereto. Any monies derived from the lease of such lands or from the sale of forest products, oils, gases, coal, minerals or fossils therefrom, shall be distributed as follows:

"(a) The expense incurred by the state for administration, reforestation and protection, shall be returned to the general fund of the state treasury.

"(b) Ten per centum thereof shall be placed in the forest development fund of the state treasury.

"(c) Any balance remaining shall be paid to the county in which the lands are located to be paid, distributed and prorated to the various funds in the same manner as general taxes are paid and distributed during the year of such payment."

This arrangement has a two-fold advantage in that it insures local control of the forest land policy and an opportunity for the counties to recover up to 75 per cent of receipts collected from lease of land or sale of its products. This has worked rather satisfactorily in the state of Washington. During the past six months the state has acquired nearly one-half million acres, one-fifth of which is covered by merchantable timber and the balance in various stages of reproduction.

According to actual measurements of sample plots, some of them fully stocked, Class A forest land has produced 65,000 board feet of lumber in a period of sixty years. Assuming a stumpage value of $3 a thousand for Douglas fir timber over a sixty-year period, one acre would return a gross revenue of $195. Deducting the costs of fire protection on a basis of 5 cents an acre per year and 3 cents for administration—representing an investment of $4.80 for a sixty-year period—and 10 per cent of the sales value of timber at $19.50, which reverts to forest development fund, makes a total of $24.30 that is retained by the state and $170.70 turned back to the county. This will net an annual return of $2.80 per acre per year for the county, which is more than they now receive from taxes on land covered with a stand of merchantable timber. The principal obstacle to this system of land acquirement is the elapsed time before the counties realize any actual cash returns.

Some of the Lake states have enacted laws that exempt forest crop lands from

general taxation, including loans made to school districts, but subject to public assessments for special improvements in drainage districts or for weed cutting, etc. After reforestation contracts have been completed between proper state authorities and owners, these lands are designated on the tax rolls as forest crop lands and the state treasurer annually pays to the township governments an amount varying from five to ten cents per acre, in lieu of general taxes, for duration of contract or until such time as the timber is harvested. The state then collects the money it has invested through a graduated yield or severance tax.

Under such an arrangement some of the pulp and paper companies have purchased extensive acreages of cut-over lands, for which they paid from $1.50 to $3.00 per acre. They established their own nurseries, planted their trees, and have successfully managed their own fire protection. Recently I had the privilege of inspecting such a project. Fifteen years ago a paper company purchased and planted to jack pine some 80,000 acres of land. The first commercial thinning will be under way by 1937. The officials and stockholders of this particular company are very optimistic and believe their investment will net a fair return.

In order to encourage the retention and establishment of farm woodlots, other states have enacted legislation that enables a farmer to secure exemption from general taxation on a limited percentage of his land which will be devoted entirely to the production of forest crops.

Still another system is authorization by the legislatures of long-time general utility bonds bearing low rates of interest, that may be exchanged for cut-over or forested lands. Under this system there is a possibility of securing a large percentage of lands that may be self-supporting. I know of one instance where a state exchanged bonds for some 42,000 acres of cut-over lands containing an excellent stand of reproduction on a basis of 50 cents per acre, the bonds bearing interest at the rate of one per cent per annum. Enough fire-killed and down cedar was sold from these lands during the first year to pay the interest on bonds for twenty years. At the end of twenty years the timber will be of sufficient size to market for piling, ties, and dimension lumber. The receipts from such a thinning may be used to retire the bonds. In the meantime the lands have cost the state no capital outlay except for forest fire protection, and the lands will support a crop of timber worth several million dollars. In other instances lands have been purchased from which sufficient cord wood and Christmas trees may be sold to more than pay the annual interest on outstanding bonds.

After every effort has been made to keep forest lands in private ownership, and the states have selected the land that is practical under existing conditions for them to carry, then, and then only, should the federal government absorb the balance for extension of the already existing National Forests.

This paper contains many controversial questions, and was prepared mainly for the purpose of stimulating a discussion that may result in some constructive suggestions for better forest-land management.

OBJECTIVES OF NATIONAL FOREST ACQUISITION POLICY

By E. A. SHERMAN

U. S. Forest Service

THE subject which I have been assigned, "Objectives of National Forest Acquisition policy", is as deep as the realm of economics, and as broad as the latitudes of political expediency. A neat little field of thought, indeed, to plow and harrow within the limits of fifteen or twenty minutes.

In the space allotted me I shall not attempt to set down categorically the Nation's acquisition policy. In the first place, no individual has a mandate to speak for the civic body as a whole. In the second place, the forest acquisition policy which has in the past actuated the Forest Service and the National Forest Reservation Commission has never been static, and is not so now. It has always been subject to growth and change, and doubtless will remain so while we remain a free and progressive people. In turn the objectives of this policy have broadened with experience and increasing knowledge and vision, and this process too will doubtless continue with time's revelations of demonstrated truth or error, success or failure.

Accepting the foregoing premise as sound, it seems to me that I may best employ my allotted time by a brief genesis of the forest acquisition idea, the original objectives of its pioneer proponents, the path along which the purchase program traveled from time to time into new fields with new objectives, a résumé of what has been done and what left undone up to date, and a closing paragraph on "Where do we go from here?"

It is an old story that the idea of federal acquisition of forest lands originated in the Southern Appalachians. One of the first bills for this purpose introduced in Congress called for the purchase of one million acres of land along the mountain ridge dividing Ohio and Atlantic drainages. It embraces the headwaters of important streams—important for their then known value as channels of commerce and their unknown and unappreciated value as sources of power and as regions of vast potential industrial possibilities — such streams as the Tennessee, the New-Kanawha, and the Youghiogheny of the Ohio system, and the Potomac and James on the east. In passing, it is interesting to note that the New-Kanawha is now the scene of a titanic legal battle for control between commercial power interests and the Federal Power Commission, with the stakes the consumers' market of an industrial region which promises to rival, or even surpass, the steel and glass empire of Pittsburgh.

The first southern Allegheny proposal was well conceived, but too limited in its scope. The problem was much greater both in area and diversity than its proponents imagined. The White Mountains of New Hampshire and Maine had its champions at this time, and finally a combination of New England and the New South succeeded in securing the passage of the Weeks Law March 1, 1911, a red-letter day in the history of forestry in America.

While the wording of the law is national in scope, it was thoroughly understood in Congress that the purpose of its acquisition features was the ultimate purchase of about one million acres of land in the White Mountains and four or five million acres of land in the Southern Appalachians of Virginia, West Virginia,

Kentucky, Tennessee, and North and South Carolina. The area proposed for New England proved sufficient for the White Mountains, but the problem areas in the southern mountains proved much greater than was then anticipated.

I cannot refrain from referring at this point to the then little-noticed provision carried in Section 2 of the Weeks Law, appropriating $200,000 for cooperation with the states in protecting private and state forest lands from fire. This has proven to be almost as important a feature of forestry in America as acquisition itself. It requires no further notice in this paper.

To this Society it is an old story of how the work of acquisition outgrew the limitations of the original act and was expanded by Congress through the Clarke-McNary law. It is also a more than twice-told tale that the administration of these laws and the expenditures thereunder demonstrated that federal operations are not necessarily wasteful, expensive, or dishonest. The record of the Forest Service and the National Forest Reservation Commission is an unanswerable challenge to those in private business who point the finger of scorn at federal inefficiency, too often because they wish it so to the end that they may profit by lax dealings. With such people business is business when their affairs are concerned, but they invariably expect Uncle Sam's business to mean always a private profit and a public loss.

From the passage of the Weeks Law down to the close of business June 30, 1936, the National Forest Reservation Commission, upon recommendation of the Forest Service, approved the purchase of approximately 25,000 tracts of forest lands of every character, lying in 31 states and one territory, aggregating 15,746,371 acres, at an average price of $3.70 per acre, or a total of $58,266,413.67. Of all these millions of acres, in thousands of tracts, neither the Service nor the Commission has ever yet had occasion to regret the approval of a single acre. Acquiring lands in regions of faulty surveys and defective title records, the government has lost by reason of faulty title less than 1,000 acres in all; and even in every such case the purchase price has been returned to the United States Treasury, so that not one single penny of purchase money has been lost.

Surely the Service and National Forest Reservation Commission may claim—and claim justly—that one of the major objectives of the Nation's forest acquisition policy was to establish a business agency that would serve the Nation faithfully and honestly by expending forest-land purchase funds in such a manner as to command general confidence and respect. The annual reports of the Commission may be pointed to each year as proof that that objective has been successfully achieved.

Naturally the forest-land purchase program and its objectives have expanded as a greater volume of funds has been made available for that purpose. So long as the maximum annual appropriation was limited to $2,000,000, expenditures of large sums for merchantable saw-timber anywhere, and particularly in the public-land states of the West, where so large a proportion of our remaining unmerchantable stands was already in federal ownership, was obviously unthinkable. But when a lump sum fund of $30,000,000 was placed at the disposal of the Service and Commission to expend in two years, and this was later followed by an additional 12 million, the pattern changed. True, this was far from sufficient to complete the purchase units already approved and under way. But ultimate completion, which means practical consolidation, cannot be accomplished abruptly without great waste of money and effort. It takes time for many owners to arrive at a

willingness to sell at a fair price. Purchases from unwilling sellers are always costly and unsatisfactory. Furthermore, when 50 per cent or more of the purchasable area of a practical administrative unit has been brought under federal ownership, the process of bringing the balance under a reasonably satisfactory form of forest management becomes relatively simple. Federal ownership is not always essential; often its objectives may be obtained by the force of example, cooperation, and coordination. Public ownership follows gradually and inevitably. The trend, within the purchase units, is always in the direction of federal consolidation, and no longer toward the dispersal of public holdings.

Out of the funds made available during the past four years many very attractive bodies of merchantable saw-timber and a few choice samples of virgin timber have been purchased. In several instances the total cost has been in the neighborhood of a million dollars. Some purchases have even been made in the great National Forest states of the West. Notable among these was the purchase of 23,265 acres of steep mountain land on a critical watershed in Utah, at an average price of $2.76 per acre. Floods resulting from the misuse of those lands in the past had caused property losses amounting to five million dollars. In Oregon 6,595 acres of heavy timber on the Corvallis watershed were purchased at a total price of $326,113. Preservation of a pure supply of water for the municipality, the ultimate establishment of a sustained-yield working circle, industrial stability, and safeguarded social conditions were the objectives in this case. In California a total of 86,135 acres were approved for purchase at an average cost of $8.54 per acre in or adjoining the Sequoia, Tahoe, and Eldorado National Forests. Here the objectives were consolidation and control of important key tracts, particularly private holdings in the great Kings River Canyon, which would otherwise soon be opened to commercial exploitation by the completion of a high-grade motor road. The Commission also gave contingent approval to three redwood areas as possible purchase units, within which it has signified a willingness to give favorable consideration to the purchase of approximately 100,000 acres of Coast redwood forests whenever the purchase fund placed at its disposal justifies so large an expenditure on a single project. The Coast type of redwood is the most important commercial species without adequate representation in our managed National Forests. The objective here is a suitable field for research to determine and demonstrate the best plan of management for this species.

The Commission approved the purchase of 244,847 acres of land in Michigan, lying within the boundaries of State Forests, at an average price of $2.66 per acre. In exchange for these lands the state will turn over to the federal government lands of equal value, which the state now owns within National Forest boundaries. Also, more liberal funds have made it possible for us to go into Texas, Louisiana, Mississippi, and Missouri in a big way, and to begin purchase work in the Piedmont region and in the rougher portions of Ohio, Indiana, and Iowa. Actual purchase in the last-named state has been limited to the acquisition of an ideal nursery site, which is being developed in anticipation of future needs either by the federal government or by the state.

The foregoing is only a very sketchy outline of some of the accomplishments, objectives, plans, and hopes of our Nation's forest-land purchase activities. Doubtless it is subject to criticism. Every man in the Republic believes he could manage the public's business better than it is being done by those in authority,

and I am not disillusioned when someone in smug and unctuous tones charges the Forest Service and the Commission with having done the things it ought not to have done, and left undone the things it ought to have done. One thing certain, the federal authorities have not acted blindly, impulsively, or without advice. It has had advisors, self-appointed and emphatic, in great multitudes, usually silent and conspicuous by their absence at appropriation committee hearings, but buzzing like flies around a molasses barrel as soon as there is money to spend. Nearly every representative and senator is convinced that the Nation's welfare will be best served if a large part of the fund is expended in his district or state. One man's followers believe we should spend a large part of the fund to create a great international park in the Lakes Region, chiefly, if not exclusively, for recreation; another thinks it should be invested in cut-over pine lands at $1.25 per acre as a background for future industrial development; another wishes us to purchase merchantable stumpage in the Pacific Northwest and rescue the lumber industry from the inevitable burden of carrying charges which is forcing the adoption of a suicidal cut-out-and-get-out policy, with all its attendant social and economic evils. Others believe we might better buy up the worn-out little mountain farms of the hill-billies of the Southern Appalachians and the Ozarks, and the steep rough lands in certain parts of southern Illinois, Indiana, and Ohio, in order that the man with a hoe may make a new start on land more responsive to his cultural efforts; the man from Boston is fully convinced that the remainder of the White Mountains (his own particular playground) should be purchased without further delay, but the man from Pensacola is equally certain that the entire fund should go into the fast-growing pine lands of the South where the naval stores industry is of paramount importance; still another wants millions spent in purchasing roadside strips of timber to preserve the scenic beauty of important highways, although five hundred feet back, from hinterland to hinterland, the remainder of the region may be a scene of economic waste and social despair; and yet another would accord preferential treatment to acquiring virgin holdings, so they may be kept free from roads and all uses for the pleasure of the select few with leisure and hardihood to enjoy nature unspoiled and unadorned; and so goes the endless litany of individual preferences.

Neither the Service nor the Commission complains at this multitude of counsel. After all, it is invaluable as a broadening influence. None of these proposals is without merit; many of them are of pressing urgency, and practically all are objectives of national importance. Eventually, if the Nation prospers and endures, most of them doubtless will be achieved. At the present moment it is largely a question of priorities.

Neither the Service nor the Commission is inclined to take a narrow view of the mandate which it has been given by Congress. The field within which purchases may be made is limited territorially to the watersheds of navigable streams, which is next to no limitation at all, while the purposes for which land may be acquired —streamflow regulation and timber production—are broad enough to cover any need, either social or economic, which may be served by federal ownership.

A spendthrift may waste in a year a heritage which he cannot regain with the labors of a lifetime. We have been a spendthrift nation in our management of natural resources in timber and timberlands. Not in one administration, or even in one generation, can we repair the waste of the past. But sooner or later this waste will surely be repaired. Acquisition is a salvage operation. The Service

and Commission in the light of past experience are using the funds placed at their disposal to promote, to the best of their judgment, the greatest good of the greatest number in the long run. Should it become apparent in the clearer light of further experience that industrial or social needs require entrance into new fields or on a larger and more accelerated program, I am certain the Service and the Commission will be found prepared to carry out the public will.

DISCUSSION

Mr. G. F. Jewett: I can concur heartily in Major Mason's and Ted Goodyear's presentations. As an owner of timberland I am filled with dread, I may even say terror, by Mr. Sherman's paper. I do not question his sincerity, nor his idealism. I can take exception to only a few statements, such as his implication that we have handled our resources improperly in the past. What does disturb me so deeply is his attitude, which to my mind is essentially un-American. The whole tenor of his remarks points to the broadening and accelerating of the objectives of government acquisition.

It is only a question of time when we shall have socialism, so far as our forest resources are concerned.

Mr. Sherman states public ownership follows gradually and inevitably. Of course, in such a short paper, he had to generalize largely. I shall have to do the same in my comments.

I went to church yesterday. The sermon seemed very appropriate in view of our present discussion. The text was from Proverbs: "Where there is no vision, the people perish." I don't pretend to be gifted with extraordinary vision, but I am deeply concerned with what I see going on in the world. This question of forest ownership is being strongly affected by world trends. There is a nearly universal feeling that our problems can best be solved for us at the national capitals of the world. For this lack of vision, many are about to perish. I am one who feels our forefathers had the greatest vision yet recorded in drawing up our form of government. I believe it is dependent upon private property rights. I therefore believe we should have as much private forest ownership at all times as is possible.

Next, I believe that of the lands which private ownership cannot carry, as much as possible should be carried by the states. The remainder should be carried by the federal government. I believe that is the thing that Dave Mason and Ted Goodyear have presented. It is interesting to me that, independently, all three arrive at the same conclusion. I feel that in the long run this will cause the fewest conflicts with our American scheme of things. Where there is state or federal ownership, I feel the door should be opened for private persons to acquire the fee title as soon as possible. That is looking forward to the future, when economic conditions undoubtedly will have changed, and we can expect conditions similar to those that obtain in Europe, from the standpoint of the value of timber.

I believe this would be facilitated if in many cases the sale of public forest products were limited to the sale of fee title, with an undertaking on the part of purchasers to keep the lands in a productive condition.

Mr. L. F. Cronemiller: I have just gone

through a three-day meeting of the Western Forestry and Conservation Association. In it considerable was said about the social responsibility of the industry. I had heard similar remarks throughout the year, and also at the meeting a year ago. Some of them were rather critical. I want to tell you men here, especially those from the East, that our western industry is not composed of a bunch of timber barons who are out to scalp the country, then let it go.

Probably the majority are now voluntarily abiding by the provisions of the Code in so far as it is economically possible for them to do so. The failure of the industry to meet its social responsibility is not entirely its own fault. What can you expect an industry to do, laboring under the archaic system of taxation which we now have? and also confronting the constant threat of the public demand for recreation, with thousands of individuals going in on this private property and causing about 90 per cent of the man-caused fires, burning up this asset, which the owner owns? In this western country he is the man who has to go out and fight that fire, and pay for its suppression. He also stands the loss in merchantable timber. So this social responsibility is not entirely his responsibility. It becomes a public responsibility. Under our present economic conditions there is no timber owner in this country who is altruistic enough, or financially able, to meet it all.

Under public responsibility comes legislation, including acquisition. We have some laws; probably we should pass others. Personally I agree with Mr. Goodyear and Mr. Mason, and also with Mr. Jewett, that in the acquisition program the private owner should get first consideration, to take and keep whatever land he is financially able to retain. Second is state acquisition. There is a strong argument for that here in Oregon, where the state owns only approximately 150,000 acres of forest land. The state should enter upon a definite program of land acquisition, taking probably delinquent county-owned land, a certain amount of cut-over land, with federal acquisition of the poorer classes of land. Here in Oregon we are proud of our cooperative set-up, state, private owners, and the federal government. The organization of the State Board of Forestry is based on that, with representatives of all three units on it. These three interested agencies should get around the table and there determine the location, the acreages, and the types of land which each should acquire or retain title to.

There is another important side of this question, from the state standpoint and also the national standpoint. The tendency is at the present time to go in and cut second-growth timber, which is just reaching a merchantable size and putting on a great deal of increment per year, while we have billions of board feet of mature timber that should be cut. The state should acquire not only cut-over lands but also a certain amount of this second-growth timber, which can be held for future cutting and thus both give the state an early income and prevent the cutting of that timber before it is properly ripe.

In that Western Forestry meeting one statement made was that we should all get around the table and talk our problems over cooperatively. I should like to add to that—get around the table and talk our problems over, act on them, and solve them.

Mr. F. H. Brundage: In meetings of this kind we are prone to set up some straw men and then get excited about them. The thing that governs this whole situation is a matter of economics. You can lead a horse to the watering trough,

but you can't make him drink; you can't make him eat if he is sick. If the states and industry can settle the problems in this territory without any additional federal acquisition, I think the Forest Service would be the first to say "Amen" to that. We haven't any particular ambitions beyond acquisition within the present National Forests of such lands as it may be necessary to acquire in order to secure their management. Any private owner of lands within the National Forests who wishes to put those lands under forest management will find us ready to cooperate with him on every basis and in every possible way; we would be very glad to have even those lands retained in private ownership. The thought that was enunciated by Mr. Goodyear and Mr. Jewett, both good friends of mine, regarding the place of federal acquisition, as being the agency to mop up the remnants, conforms exactly with the statements of the Forest Service for several years.

I have taken a good deal of pleasure in persuading Ted Goodyear and some of these other state agencies out here to go a little faster, if they could, in their state acquisition programs. In Washington a million and a quarter acres or thereabouts has lost its attraction for private ownership. If the state steps in and takes up the slack, that will be fine. But the state has acquired to date only some 300 thousand acres, and the Forest Service, I think, only some 40 or 50 thousand acres since the Forests were first created. As an octopus about to take up all the land in Washington, I don't think we need to be feared very much.

I like to see these problems treated in a realistic way. We want to talk about facts, and not let our ideas or our emotions run away with us. I would like to make a few comments on Goodyear's statement regarding taxation in Washington, but I shall have to forbear.

Mr. A. E. Wackerman: I am much interested in what Mr. Goodyear and Mr. Mason have said about forest acquisition in the Pacific Northwest. I am not going into the subject of forest acquisition in the South, about which we talked last year at the annual meeting in Atlanta; but I do want to say the papers of Mr. Goodyear and Mr. Mason coincide very closely with what some in the South think about forest acquisition there. Also, I feel very much as does Mr. Jewett, that it is an exceedingly depressing thing if we tell land owners that they can't own the land much longer. I would hate for some of our progressive forest owners in the South to be told that; I fear they would be discouraged in protecting their lands against fires, etc., for future crops.

Chairman Greeley: Is Mr. Scritsmier in the room? I am going to exercise a dictatorial power as a chairman and ask him to say a word or two.

Mr. H. F. Scritsmier: Our subject is a big one. Like a horse race, it brings out a lot of difference of opinion. The public has a great interest in our Pacific Northwest lumber industry. For many years we have tried, at intervals, to do something for that industry. We started out with an association, but it went on the rocks. Then there were several merger attempts, which at one time looked as though they were going to get somewhere; but they failed. Out of it all I think we have got some good; we have found we need a Moses. When the depression started we realized more than ever that we needed a Moses.

In private ownership of timber one of two things happens. Either you cut the timber and put it on a market that can't absorb it, or you keep it and they tax it away from you. I think the time is going to come when, out of these various meetings, we are going to have a taxation program that will solve some of our

problems. You cannot carry your timber indefinitely, and if everybody puts his timber on the market, as they have tried to do, they overburden the market and are all working for nothing. In our large operations here on the Coast, not only is the natural resource harvested and nothing got back for it, but a lot of good money is put in. Look over the whole coast here; whether the big operations are on the Olympic Peninsula or down in southern Oregon, very little money has come back. Those are things that the public inclines to get interested in, and I think rightly.

I am for private forestry, private ownership, but we haven't yet got anything that is solving our problem. We must find some way to take care of the stressed and distressed property. The timber is being harvested, much of it immature. That is wrong, but the private owner has got to be encouraged and given some assurance that he will get credit for carrying it. If private forestry can be brought about, that is the solution. In my judgment, private forestry to date has failed. We have got to have some strong agency to take up the slack. Look at the map and see the checkerboard ownership, and consider the contour of the country. We have tried various ways of consolidation, and failed. If the government and state agencies can come in and take some of the distressed property off the market, I think it will go a long way toward stabilizing an industry that is the backbone of our country.

Prof. Walter Mulford: The better-informed public opinion in California has already taken a definite stand as to who should own the forests. The State Chamber of Commerce is particularly effective in California. It has active branches in each region of the state, closely coordinated through the strong central body. This organization made an extended study of the question of forest ownership. After a challenging discussion of the committee report by the Board of Directors, the Board about three years ago adopted a policy which has since that time been the basis on which the State Chamber takes action.

This policy is to the effect that private forestry should be strongly encouraged; that the public should take the necessary steps to give private initiative every possible chance to succeed; that, after a reasonable period has elapsed, areas which the private owner finds he does not wish to manage in accordance with forestry principles should pass as rapidly as possible into public ownership; that this public ownership should be by the state rather than by the federal government, except lands within the present boundaries of the National Forests or within minor modifications of those boundaries, and lands for a new National Forest in the redwood region.

Mr. Brundage said that he would like to comment on Mr. Goodyear's statements on taxation, but that he would refrain. I shall not refrain, because we should have in mind a more complete picture of the situation. I imagine that Mr. Goodyear purposely omitted some factors in order to provoke discussion.

Mr. Goodyear has called attention to the very small income to the local communities from certain National Forest areas, resulting from the percentage of the gross receipts paid to the local community by the federal government, as compared with the income which would have accrued from regular taxes if the property had been in private hands. The areas in question probably are in localities which are relatively inaccessible as yet. Naturally the income has been small to date. In due time, when the National Forests come into their own, the ratio will probably be reversed.

In any event, at least the local com-

munities have received the funds. The federal government has been solvent. Who knows how much of the area would have become tax-delinquent had the lands been turned over to private ownership?

This leads me to express my hope that some day, in order to smooth out the fluctuations in income to the local communities, the federally owned forests will pay a flat rate per acre per year instead of a percentage of income.

Mr. C. L. Billings: I thought as I heard the first two prepared papers there would be a lot of amusement if not resentment at the casual way that the Forest Service was allocated to a very poor third place in this matter. When Mr. Brundage said what he did about that allocation, it just seemed to me that the old horse ain't what she used to be, and I am going to tell Silcox when I see him.

We are not concerned as much as we think we are as to who is to be the steward in this thing. We are concerned as to our record on who the steward is going to be. There is a social obligation in ownership. This should be worked out not on the basis of 1, 2, 3, but on the possibilities of each area, and who can do the best job on it.

Where some timber owner has a quarter-section on top of a mountain, but the Forest Service owns the surrounding land and has it under management, that is one situation. Reversing it, a nice quarter-section lies at the mouth of some creek; the Forest Service should deed it to the private operator. Isn't that fair? I use those two extremes not intending to slight the states, but to try to get us to think for a minute on the question who is going to do the best job in the long run.

Mr. W. G. Weigle: That raises a social question that we have got to recognize. Will the federal government, the state governments, and the private interests each carry out its part of the program so that the most good will result?

I believe there is room in the states of Washington and Oregon for the federal government to enlarge its holdings. It may be that some outlying pieces of the National Forests should be cut off and given to the states, but there are areas elsewhere that should be taken in to promote a more systematic administration. I believe that the states should take over all the cut-over lands that can't be held by the private owner and that they can carry. The other agencies should get around the table and decide just what lands should be assigned to each. But the private owner should be held to certain restrictions. If he is going to continue to hold his land, he ought to hold it so as to make it most beneficial to the country at large, not hold it for ten or fifteen years until some condition arrives whereby he can unload. It makes my heart sick in going around over the country, to see little mills here and there picking out four or five trees and destroying a large area that should be left standing for the next fifty years. That should not be allowed, and the state should see to it that it does not occur. I believe that the states have the chief right in getting hold of this cut-over land if the private owner cannot carry it on in the proper way. Private ownership in the state of Washington has not been very successful up to date. Unless it can do better than it has done, I think the state should see that action is taken which will bring about the best result for the state. I believe that the state and the private owner and the federal government should get around the table and decide how this land should be divided up and taken care of.

Mr. A. H. Hodgson: I would like to say a few words, not as a representative of the Forest Service, but as a man who has spent about fifty-two years on the West Coast.

About forty years ago I used to sleep occasionally in the summer time on a hay stack in the Sacramento Valley. Looking towards the east, north, and south, for miles and miles, I could see fires burning in the forests of the Sierra. Towards the west I could see the same in the Coast Range Mountains. My father used to take me on trips up into the mountains in the fall, after the crops were harvested. We would travel for miles through most magnificent stands of sugar pine and yellow pine timber. They were like parks; you could see for hundreds of yards in all directions; there was no reproduction to obscure the vision. Also I noticed great scars in the virgin trees. Many of them were down. My father used to point out that these conditions were due to constantly burning the forests. When you have fire, you can't have young trees. But at any rate, we took great pride in those magnificent forests we drove through.

Today, many of those same forests are nothing but stump land, charred and with very little reproduction coming up.

Later on I got a job with the Forest Service, and traveled over parts of the Northwest. From time to time I heard various proposals made to improve forest conditions on private lands. Many were made by the lumbermen themselves. As time passed, I wondered why the lumbermen didn't take some action on these proposals. Certainly they were not practicing forestry.

Later on I had the job of making a waste study on Douglas fir cut-over land. I found that an average of about 20,000 board feet of merchantable material was left on the ground after logging; in some cases as much as 30,000 or 40,000 feet. Personally, I feel that had the natural resources of the Northwest and California been left in the hands of the lumbermen or of the states, Pinchot's prediction that we would be out of timber in 25 years would be true. But fortunately the Forest Service stepped in, and those fires in the Sierra Nevadas and the Coast Range ceased; and young trees began to come in.

At the Western Forestry Conservation meeting the other day, I heard a number of men say some pretty unpleasant things about the Forest Service; and it seems to me that the sentiment of this meeting is a little lopsided. The point I want to make is that the Forest Service has done a wonderful job in getting this whole forestry idea started on the West Coast; and I don't think it should be minimized. I think the Forest Service has always played fair in the matters that have been under discussion this morning. The Forest Service, so far as I know, has never gone out and grabbed land from the private owner, or from states either. It has always been anxious to see that forestry was started on a sound basis, and carried forward. Somebody has got to do that, not in the future but now, if you are to have any timber left. All three of the agencies have a big part to play in establishing sound forestry; they should get together; but in these discussions I think it is about time that the Forest Service is given credit for what it has done in getting the various activities started and helping to make the public forestry-minded.

Professor Fritz: Gentlemen, this report of the Committee on Acquisition Policy deserves some action. A meeting like this cannot determine the policy of the Society. This is done by the Council. This meeting, however, can adopt the recommendations of the Committee, and so present them to the Council for consideration as a final policy of the Society.

I can't see that we are going to have any assurance of stability in management policy if more land is in public hands. We have seen already in the past few

years the instability of public activities. I rather concur with Mr. Goodyear that we have gone far enough, on the whole. There may be some sore spots and critical places that require further acquisition.

Mr. Sherman has said that we have been a wasteful and spendthrift nation. Certainly we have. Every pioneer nation is spendthrift and wasteful. I think we are more wasteful today than ever. What is more wasteful than the waste of human effort and the waste of dollars that measure human effort? And like Mr. Jewett, I am filled with terror of what will happen to the cost of forest land management if too much of it is in public hands. I move that the recommendations of the Committee on Forest Land Acquisition Policy be referred to the Council for consideration and for adoption as the declared policy of the Society. If you wish to make comments, criticism, or suggestions, take the recommendations home with you, study them, and write to the Council, because the Council has the final word.

President Chapman: I want to make a statement regarding that. The Constitution of the Society provides that no meeting can take action binding on the Society, for the reason that only a small portion of the members are present. The Council is authorized to express the policy of the Society to the best of its knowledge, but its action is subject to a petition of fifty members to bring the policy before the entire Society for ballot.

Chairman Greeley: In the absence of objection, I will hold that the motion is passed and the report is referred to the Council. If any of you wish to discuss the morning's subject further, the opportunity is open.

Mr. Myron H. Wolff: I am with the Forest Service, but I am at a meeting of the Society of American Foresters. We all agree, don't we, as foresters, that the objective in regard to forest lands is to maintain them productive of all the benefits that foresters talk about, that flow from forest lands? We also recognize, at least those of us in the Northwest, particularly in the northern Rocky Mountains, and I judge in some of the other regions, that owning forest lands and protecting and developing and maintaining them is not a juicy plum. To serve the greatest good in the long run is not something you grab for as a source of profit; the outgo is usually greater than the income.

It has been suggested that the private owner should control forest land just as far as he is able to, and when he becomes unable to meet that social responsibility, the public should take it over. Then the question becomes whether it should be the federal government or a state government.

Why not the state? Well, sometimes the state cannot redeem that responsibility. Sometimes, too, other states have an interest in the land. The headwaters of the Missouri River rise in my home state of Montana. Assuming the private owner cannot redeem the responsibility, can the state? It probably cannot handle the load all by itself. Then why should not Montana say to Louisiana, you are interested in this, too; so are you, Kansas, and you, Tennessee; why not come in and help me? That is what federal action does.

I am not holding a brief for the Forest Service, but I would like to suggest that the Clarke-McNary Act, designed to favor private forestry, is federal action. The federal government did not reach out to grab a ripe plum, but assumed a responsibility to realize a public benefit. Through the Fulmer Act, fostered by the Forest Service, the federal government seeks to encourage the states to take on as much

of the load of forest ownership as they can. The Fletcher Bill is another illustration. If one reviews the whole field, he will see that the federal government is not reaching out for ripe plums, but is merely trying to meet its part of the responsibility while helping the others do their share. It is not getting profit out of the land, it is after human benefits.

At this point the morning session adjourned.

MONDAY AFTERNOON SESSION, DECEMBER 14, 1936

SUBJECT: SUSTAINED YIELD, WHAT IS IT, AND HOW CAN IT BE ATTAINED?

Chairman: C. S. CHAPMAN

Chairman Chapman: Our topic is sustained yield. There is a good deal of difference of opinion as to how it can be attained. It is an important subject, and should bring out plenty of discussion. I hope that our deliberations may be characterized by the same frankness as were this morning's. This is a professional meeting, and everyone here is entitled to express his views freely; and no one should feel aggrieved if the activities he is engaged in happen to receive criticism.

The Chairman then called for the presentation of the following papers.

DEFINITION OF SUSTAINED YIELD

BY C. J. BUCK

U. S. Forest Service

FOREST management for sustained yield has for its objectives production of annual timber crops of approximately equal size, maintenance of stable industrial communities furnishing permanent employment, wages, and purchasing power, and attainment of full use of the productive capacity of the forest lands. The conception is that of an industrial community composed of various wood conversion factories, with trade and social facilities permanently supported in large part by the raw material supplied from a tributary forest area. This forest area may not necessarily be closely contiguous to the manufacturing plants, and the products of several sustained-yield units conceivably may contribute to the wood conversion center, as in the case of forest properties supplying a general log market such as Puget Sound.

From a technical point of view the forest property with its basic natural resources may be regarded as the indispensable requisite of a sustained-yield unit, but the raw material originating there cannot be converted into useful products without the application of labor. It is the assurance of a constant supply of raw material and security in the employment of labor which lead to permanence of manufacturing development, and the two together insure the opportunity for social facilities deemed essential for human contentment.

There are three general requirements for sustained yield: (1) stable ownership of forest land, (2) unified control of the property, and (3) scientific management of all important biologic, commercial, and social processes.

Numerous potential sustained-yield units are prevented from becoming so managed because of the multiplicity of land owners whose diverse interests prevent them from agreeing upon a logical and permanent policy for the whole unit. This condition is aggravated by ownership arrangements which are fundamentally unsuited for the business of stable and permanent management. These, coupled with burdensome carrying charges, result in recurring shifts of ownership which are incompatible with sustained-yield plans.

A sustained-yield unit is a complex biologic and social entity. Scientific control is essential to continuous productive management of such an entity. The technical problems upon the solution of which sustained yield, as broadly defined above, is contingent, comprise those pertaining to the growing of forest crops and to other forest-land uses; those concerned with the utilization of forest products; and those relating to social conditions.

Wise management of all these processes is vital to successful attainment of the objective sought.

The application of sustained-yield management to the Northwest will unquestionably increase the ability of forest lands to employ and support labor. The silvicultural operations necessary for maximum yields will maintain forest covers and insure perpetuation of forest influences upon streamflow and control of erosion. Sustained yield furnishes an opportunity for removing forest lands from submarginal agricultural operations and putting them to profitable use. Stable tax bases furnished by continuously productive sustained-yield units and permanent industrial communities are the antitheses of diminishing returns and poverty stricken counties. In addition, predictable yields going to market through known centers of manufacture furnish fixed bases for long-time social and industrial planning.

SUSTAINED YIELD PROBLEMS IN THE WEST

By EMANUEL FRITZ

Division of Forestry, University of California

WE are inclined to regard sustained yield too much according to European standards and to try to apply it too uniformly to all parts of our own country. In Europe, land use has been very definitely determined by actual needs through centuries of economic evolution, and forest property boundaries, as one result of this evolution, have become well established. In the western United States we have been using forest lands for considerably less than a single century, and no very urgent needs have arisen to determine definitely that this or that piece of land must be in farm or in forest. There is as yet no urgent need in sight for even a fairly definite demarcation of areas for the uses to which they are naturally suited. There is still a considerable surplus of land, and a surplus of timber. Our communities are very young; no one has an inkling of needs only ten years off, so rapid are the changes; no one knows yet what the present forested lands are good for besides growing trees. It is conceivable and quite probable that more of our own forested western lands will be converted into farms or pasturage. We are still in an experimental stage. A finely woven sustained-yield program does not fit an experimental era.

Furthermore, our western timber is virgin growth made up of a mixture of species, sizes, and age classes and of sound trees and cripples, determined largely by chance through long processes of succession in the thousands of years of development. No one yet knows how, from a purely forestry standpoint, this virgin forest should be handled to convert it from a miscellaneous body of timber to one of as orderly and manageable a character as a European forest. That the process of converting the old-growth to a manageable younger growth is a long one and might take easily more than three cuttings and a century and a half to culminate, is a fact that is seldom taken into consideration. The present cutting is merely the first step in the conversion process.

From a forestry standpoint our most important problems in the western forests are (1) prolonging the life of the virgin timber, and (2) conducting the first cutting in such a manner as to make the greatest headway in the process of converting the helter-skelter virgin forest to a manageable one with the utmost economy. The mere fact that a sustained-

yield plan is written out and put on paper does not solve these problems.

A sustained-yield plan presumes that whatever timber is cut will be followed by new growth. Do we know how the first cutting should be conducted, as to silvicultural and successional aspects? How do we know that we will get a satisfactory stand following the first cutting? Do we know how to dispose of the incredibly large amount of slash that accompanies the first cutting, without endangering the trees we have left? Do we know what the taxing authorities, local, state, and federal, have in mind? Do we know how much of our present lumber markets can be held? Is an industry that has no written logging plans going to regard a written sustained-yield plan seriously? Is the general public actually interested enough in sustained-yield forestry to dig down for the cost of better fire protection? Is it willing itself to be really careful with fire on another's property? I think these questions are important. They don't mean that we should lay aside any consideration of sustained yield—not at all. But I think they do point to certain jobs that must be accomplished before sustained yield can be regarded as anything but a battle cry, and before an investor will take it seriously.

I am as much interested in effectuating sustained-yield forestry as is any other forester, but I see certain things that need to be done before a written sustained-yield plan is really worth the effort of writing it down. For example, and thinking now only of western virgin forests, we must know more definitely how the cutting should be conducted, and just how much of a crop we can expect after our first logging. We will have to learn how to dispose of the slash economically, effectively, and with safety to the trees left standing. We don't know these things now for private lands, where every dollar counts. At the same time, foresters must take a common-sense and practical viewpoint of forestry, what is possible and what isn't. It is important in selling anyone an idea that the seller gain the confidence of his prospective customer. This is probably forestry's hardest job.

So, to effectuate sustained yield in the West we have an entirely different problem than if we were in Europe and had European conditions. The Europeans can write sustained-yield plans that mean something because they have already prepared the groundwork, because their forest areas are well defined, and because there is an assured market for the products.

I suggest, therefore, that instead of giving all our thought to the desirable end-result—sustained yield management—we allocate a major portion of it to those preliminaries that must be disposed of before the end-result is actually achievable.

I caution also against attempting to rush toward the goal. A step-by-step approach, each step so taken that it is correct and need not be retraced, should be the most certain and, in the long run, the quickest way of arriving at sustained-yield management.

Since I feel so strongly that certain things must be gotten out of the way first, I will not give a definition of sustained yield, but will cite what I believe we should and can attempt right now in the West: "The logging of timberland in such a manner that the merchantable mature trees are removed as needed for the markets; the preservation of as many of the immature trees as operating conditions will permit; steadily improving slash disposal; and, the protection of the cut-over land from fire, insects, disease, and trespass." At the same time, and as we get experience and data, we can explore with increasing thoroughness the nature of a practicable sustained-yield program.

SUSTAINED-YIELD FORESTRY

By A. E. WACKERMAN

Southern Pine Association

THE simple definition of sustained-yield forestry does not always mean the same to all foresters. A continuous annual or periodic production of forest crops in approximately equal or increasing amounts on a given area of forest land is sustained yield. From this point on, however, there seems to be much difference of opinion about it.

Forest management must deal primarily with trees and, therefore, with crops of wood substance or substances such as gums and resins derived from trees. Therefore, we should not limit our definition of sustained-yield forestry to the production of one particular type of forest crop, such as saw-logs. The type of forest utilization may and probably will change markedly, and if one form of utilization declines and another increases, the sustained yield of the forest need not be disturbed.

For years most observers of forest conditions in the South predicted that the decline and demise of the southern pine lumber industry was just around the corner. They thought a sustained yield of timber in the South was out of the question because the old-growth virgin timber was not being replaced rapidly enough to maintain the industries' requirements. But they were wrong simply because utilization changed, and second-growth timber is merchantable and can be and is being replaced readily. In some instances a particular forest may shift from saw-log to pulpwood production or a combination of both, and while the saw-log production might decline, the increase in other forest crops would keep the area in sustained yield.

The intensity of forest management to obtain a sustained yield is another matter entirely, being dependent upon the economic environment. A large forest area managed for permanent production at the rate of 100 board feet per acre per year is just as much on sustained yield as one of half of the area but growing twice as much per acre. Therefore, the intensity of silvicultural methods and management plans is no criterion of sustained yield.

Briefly then, sustained-yield forestry means the continuous annual or periodic production of forest crops in approximately equal or increasing amounts on a given area of forest land. The forest crops need not be maintained in the same form year after year, but may, and in part will, change to meet changes in utilization practices and the needs of the consuming markets. The intensity of forest management, as indicated by the yield per acre, is dependent upon the economic environment and is not a measure of sustained yield.

DEFINITION OF SUSTAINED YIELD

By T. D. WOODBURY

U. S. Forest Service

IT has been said that difference of opinion makes horse races. Apparently the program committee hoped to see a horse race when they requested several men with somewhat different backgrounds to define sustained yield. Evidently they are not going to be disappointed.

While our forestry literature of recent years is filled with discussions of sustained yield, but few authors have attempted to define this practice. Generally, their themes have been either the many benefits to be derived from sustained yield or reasons why it is not applicable in present-day American forestry practice. If sustained yield is a desirable practice that we wish to attain, it would seem to be elementary that we should know where we are going before we start.

Apparently many of us are not satisfied with the orthodox definition of sustained yield as a form of forest regulation under which no more than the net current increment of the forest is continuously harvested. Such a definition, devised to fit conditions in a normal forest, very naturally cannot be applied successfully to our two main classifications of forest area: (1) the virgin stand, with little or no net increment because of the predominance of overmature timber, or (2) the heavily cut area, with abnormally small growing stock, largely of unmerchantable species.

Can we reconstruct a definition of sustained yield which will meet our present situation in American forestry, or should we abandon the use of the term and find a more realistic one to denote our generally accepted satisfactory type of practice? Personally, I sometimes feel that the expression "sustained yield" has been stretched beyond the elastic limit by some who seem to feel that unless they unfurl the sustained-yield banner they will be subject to jublic criticism. The practice of periodic yield, with due regard for good silviculture, is far preferable in my estimation to pseudo-sustained yield.

For the types of Pacific Coast forests with which I am familiar, I offer the following definition of sustained yield: a type of forest regulation and silvicultural practice based upon a written plan of management designed to improve continuously both the net growth rate and the species composition of the forest, and to furnish a continuous cut which will yield a fair average rate of return upon the investment.

The first essential of this definition is a written plan of management. Consistent accomplishment without written planning is difficult if not impossible to secure in any line of endeavor. With the changes in management to which our forest areas are subject, original objectives are lost sight of without written planning, and the continuity of action so essential in handling a forest crop is not likely to be attained. As a matter of course, any plan must be revised periodically to meet changing conditions.

The second essential is the improvement of the net growth rate of the forest. To accomplish this improvement requires the removal of overmature, slow-growing timber, and protection from the forces which destroy the forest, such as fire, disease, and insects. The securing of reproduction

is also essential to building up growth rate and to continued forest production. From the standpoint of improving rate of growth, very light selective cuttings designed primarily to improve the quality of the cut, such as are now advocated by some, seem objectionable, since it is unlikely that such cuttings will open up the forest sufficiently to stimulate growth. I believe that a moderate sacrifice in quality of cut is justified in the long run to stimulate growth.

Also, when the first high-quality cut is made would appear to be the time when the owner can best afford to undertake forest improvement work. The improvement of the species composition of our mixed forests has been a perennial source of argument between federal and private foresters. The requirement that some improvement of species composition must be made in such forests is based upon the premise that inferior species will continue to be of relatively low value for many years to come, and if left to their own devices will appropriate more and more of the available growing space. I contend that some improvement in species composition should be made currently rather than to trust to luck that these species will become valuable later and may be harvested at that time at a handsome profit. Sound and workable long-term plans do not result, as a rule, from that sort of speculative planning. In respect to this requirement, some present investment must be made in the interest of larger future profit. Is not building for the future an essential of forestry, as distinct from lumbering?

My definition contemplates a relatively heavy cut during the first cutting cycle, due to the preponderance of large, high-quality, but largely overmature timber. During the second cutting cycle, data for typical pine stands indicate about a 35 per cent reduction in cut. In succeeding cutting cycles, as the stand approaches a normal forest, the benefits of the forest improvement and protection work done in previous cycles will be reaped. An increasing growth rate will allow of cuts even heavier than that of the first cycle.

Since objectives of ownership govern forestry practice, varying objectives must be reconciled before any one definition of sustained yield will be acceptable to all classes of owners. Under present-day conditions it is recognized that such reconciliation is difficult of attainment. In my opinion, the owner who demands the largest possible net cash return from his virgin forest area during the first cutting cycle must of necessity degrade the forest. Such degradation is not consistent with sustained-yield management. A part of the annual return must be invested in forest protection and improvement in order to secure a satisfactory continuous income. This elementary principle has long been recognized as essential to success by stockmen and dirt farmers. Is it not equally applicable to forestry?

Our profession should set up a liberal definition of sustained yield, which takes into account to a reasonable degree the conditions imposed by the character of our forests, our markets, and our transportation facilities. Standards for such a definition having been set up, they should be adhered to by all those who wish to adopt this form of regulation. These standards cannot be altered at will to fit individual practices; rather, the practices must be modified to fit the standards.

A WORKING DEFINITION OF SUSTAINED YIELD

By W. F. RAMSDELL

School of Forestry and Conservation, University of Michigan

SUSTAINED yield is a general term. Whenever the term is used in situations where much may depend upon the interpretation of its meaning, it should be defined in accordance with the intent for the situation concerned.

The generally accepted meaning of sustained yield as applied to forestry enterprises is continuous production of commercially useful wood products from a given forest property. The size of the property involved in any specific sustained-yield objective is normally that embraced in the entire working circle. The working circle in turn connotes limitation in extent, approached from the economic stability viewpoint. Specifically, we can not approach community stabilization, the prized end-product of sustained yield, by any revival of the short-lived "Blue Mountain Working Circle" concept, involving several million acres of mountainous territory with a number of dependent communities and transportation outlets. Under the most ideal conditions, or may we say, when the forest property has perfect regulation of the growing stock, the production, or yield, is continuous not only as to time but also as to value and as to financial returns, and is also optimum as to area cut yearly adjusted to the silvicultural system employed. The yearly increment on the whole property is at a practically constant level and is balanced by the yearly cut. This is the implication of sustained annual yield.

This ideal situation is one, as we know, which has as yet been arrived at upon practically no large forest properties in the Pacific Coast states, or even in the United States. Even the average National Forest working circle is far removed from this ideal sustained annual yield set-up. We all agree that the National Forests are under sustained yield management, but for various and sundry good and sufficient reasons there may be rates of cutting during long periods of years which are far in excess of, or far short of, those which can be maintained ("sustained") during succeeding years. We are practicing a sort of sustained-yield management on these properties, but more accurately we are now attempting to bring about an eventual normal growing stock and thus striving toward the *attainment* of sustained annual yield.

This situation in itself indicates the general character of the term. We know that under our American conditions we have for the most part forest property yields which are irregular as to time, volume, value, area distribution; any or all, in varying degrees. Right now we have a pretty fair measure of periodic sustained yield on our northern Michigan swamp conifer type areas, private and public, with little planned effort, while on the adjacent sandy soil pine lands it would be impossible to stretch or liberalize the term sufficiently to apply. Sustained yield might be technically complied with under wretched productivity, simply by balancing low increment with low cut. Economically, there is more incentive toward a high plane of productivity under sustained yield on private than on public lands. The degree of irregularity which is permissible for any or all of these factors under the term sustained yield must be arbitrarily determined if, for example, the term is to be used in legislation or in quasi-legal situations. One at once visualizes the obstacles confronting nation-wide application of any such definition. The need for regional if not more localized definition

is apparent, again referring to legislative implications, just as a similar need was found necessary with the rules of forest practice under the Code.

In conclusion it may be of value to emphasize:

1. In the United States sustained yield is not a thing accomplished, but an objective toward which forest management is being pointed.

2. The sustained *annual* yield objective is not simple of attainment even upon our most advantageous publicly owned lands. We are of necessity learning as we go. We have made mistakes, and probably will make others, which may not show themselves for many years. There are pitfalls between physical possibility and economic feasibility.

3. The whole economy of current local and state governmental services is now based upon the taxation of liquidation management; it must be adjusted to the income-producing capacity of sustained-yield management if the latter is to become a reality—unless subsidies or aids from other sources make up the difference. This is basic.

4. In view of the above and innumerable other factors, we are apt to have little success in legislating sustained yield *per se*.

5. Sustained yield is an objective which *is* susceptible of advancement through legislation dealing with its controlling factors—fire protection, taxation, cooperative management, forest credits, possibly simple minimum silvicultural measures, etc.

6. From the public viewpoint, success in the sustained-yield objective will undoubtedly be measured in terms of the ability of the forest property to sustain its contribution to economic and social stability through its grand total of yields and benefits, and not alone through finely regulated growing stocks and maximum wood-cellulose production. If present trends are any indication, we shall see the sustained annual yield of wood products deliberately disturbed upon hundreds of thousands of *publicly* owned forest acres to secure better yields of other products and benefits—our old friend multiple use. It is fallacious to assume that it is best from a national policy viewpoint for all sustained-yield management on either public or private forest land property to be on an intensive optimum production plane. This does not detract from the desirability of attaining the highest possible degree of sustained annual yield of wood products where such is the object of management, but it does have a direct bearing upon our manner of approach, particularly legislative, toward attaining sustained yield from the woods on private lands.

For practical purposes of broad regional application to all classes and ownerships of forest lands, sustained yield is a *policy* of forest-land management involving continuous economically useful productivity of the land as the minimum objective, and optimum annual yields of products and benefits as the maximum objective. With the well defined general principles as a guide, each working circle must be determined and plan of management prepared to suit its particular capabilities, needs, and requirements. Success in the establishment of sustained annual yield will be attained gradually, with the best suited management units first, and not with a widespread rush, even with favorable legislation.

DISCUSSION

Mr. Walter H. Meyer: I, personally, am not interested in the definition of sustained yield. What I am interested in is its application. Last year I had occasion to try to impress upon my students what forestry practice really is, using a concrete example. I need not mention the place; that is inconsequential. I was able

to summarize four highly generalized steps. First of all, we had to determine the intent of the owner and operator; we had to get a reasonable assurance that forestry practices would be carried on indefinitely. The second step was to determine the annual cut, and what assurance there was that this annual cut would be continued indefinitely. The third step consisted of making the survey. That involved dozens of minor steps. We had to get the timber volumes, forest types, areas, the possibilities of additional income, the total amount of annual growth, and the possibilities of coming back for second cuts. The fourth step is the definition of the practice. In this specific operation the intent of the owner was splendid. I couldn't ask for better acceptance of and interest in sustained yield. As to the second step, we found that the amount of the annual cut of the existing mills fitted into the picture very nicely, and that the owners and operators of that particular tract were not interested in expanding to their utmost in order to get the cream of the crop off in the shortest time. They were convinced that their method of forest practice should be such that the operation would be handed down to succeeding generations, and they wanted to know how it could be done.

From the survey, the third step, we found that large areas of virgin timber are directly accessible to the manufacturing center. Most of the timber had to go out that way; there was no other way to get it out; it was bottled up. The growth rates were splendid, about as good as could be obtained in that particular region. Up to this point, everything seemed fine and rosy.

Then we started to investigate the ownership. It was of four types—private, Indian lands, National Forest, and state forest lands. And here is where we hit a blank wall. We could not reach a solution regarding the ownership. So, in our definition of policy, we had to evade the issue by giving four methods in which the area could be developed. One method eliminated the public ownership entirely and depended simply on private ownership. The three other methods concerned the different types of government ownership.

Why did we hit a blank wall? On this area the state has a fine batch of state timber, the finest that the state owns. The state policy is to sell the timber to the highest bidder. I believe cash payment is required. The timber must be cut in five years. The purchaser pays taxes on the timber until it is cut, and if it is not cut in five years there is a five per cent ad valorem penalty every year until the timber is cut. That policy incorporated in sustained yield would be absolutely deadly to it. The National Forest timber on this area was of little consequence; had it been large, I am not certain whether it could have been incorporated well in the policy. I don't know whether the Forest Service is allowed to enter into term contracts. I believe there is specific legislation required in that respect. Indian timber is also indefinite. Under the Wheeler-Howard Act, self-government by the Indians is apt to cause a rather unsatisfactory sequence of events.

It seems to me that by summarizing these four steps we can get a very good picture of what is needed to apply sustained yield, and no definition should avoid the issue in any one of these items.

Maj. C. S. Cowan: When Christopher Columbus set out on his voyage he didn't know where he was going, and when he got there he didn't know where he was, and when he got home he didn't know where he had been; and he did it all on borrowed money. In sustained yield, where should we start from? We have a tremendous area of cut-over land capable of producing timber. Mr. Wacker-

man wants to convince us that the South can grow nearly as much timber per acre as we can. Certainly we can produce timber from our cut-over acres; and that is where we should start from.

Where are we going? We say that we should have some plan as to what we can do with this timber when we have grown it. Well, how can we do that? For the past twelve years we have had a tax inquiry going on, and all they have done or can possibly do is to produce a report of which the net result, so far as the state and counties are concerned, is absolutely nothing. It is not the fault of the tax inquiry; it is the fault of being a democracy. You have to go around to every county to change the mind of the county assessors.

Why apply sustained yield only to standing timber, when the easiest way to have sustained yield is to apply forestry to your cut-over land? Isn't that your problem? Every speaker has stressed the point that we must have, among other major matters, good forest protection. Yet we have to fight for a paltry million dollars to complete our forest protection program, though we go spending several million dollars trying to achieve ideals that we are not sure we want. And we are trying to do it on borrowed money. It seems to me that if you want sustained yield, you want to make your cut-over land produce. The realistic end of it is proper forest protection.

Mr. John B. Woods: I remember a story by O. Henry concerning the adventures of an Indian, described as not the kind of an Indian who would let a cigar store sneak up and stand behind him. I wonder if we foresters haven't stood still and let this sustained yield sneak up behind us. We know that we have some very excellent demonstrations of sustained yield back in the state of Maine. We know that Mr. Wackerman is describing not a pious wish but an actuality in the great southern pine region, where from my own observations I agree that probably there is more sustained-yield management and less in the way of written plans than anywhere else in the country.

Here on the Coast, in the two states with which I am familiar, we have great reserves of timber. I want to approve the prescription of good old Dr. Fritz as to what is the first step in catching up with ourselves—to cut the first crop in such a way as to make sure that another one is coming along. I want to put in with Charles Cowan, although everyone here knows that he needs very little help. But as I see it, we have, right in our door yards, material for realizing this sustained-yield objective. Taking the country as a whole, we are already on sustained yield.

In my own state of Washington we have a lot of high-grade cut-over land, of which possibly a considerable portion eventually will be put into agricultural use; but we must grow a crop of timber on it. We must get started right now, so that we can avoid the slump in yearly output in the day-after-tomorrow future. Then the next step will be bringing areas into some form of unit management.

My picture of that is something like this: Operators who have been proceeding under the old tradition of quick liquidation, after they have operated beyond the time limit which they expected, progressively move forward by extension of those operations until a day comes when they realize that they can continue permanently. Some will do it under their own power, with the strength of their own financial set-up. Others will join their timber to state timber, Indian timber, and possibly Resettlement Administration timber and National Forest timber. These may be built into units in which two, or three, or four out of the five may be united in joint management units. I don't see anything impossible about that.

It is true that certain legislative authority must first be obtained; as has been correctly stated, it can't be done in the case of timber owned by the state of Washington, today. I believe it can't be done on the National Forests unless an association or quasi-public group is involved. But there is no reason why legislation shouldn't be enacted to make the course possible. Now, whether it takes five years or fifty years doesn't matter so very much so long as we are not losing ground with our growing stock, so long as we are educating our public to realize that the little yearling seedling is what the yellow fir of today was five hundred years ago.

But one thing worries me. What is the best form of ownership to make this possible? We haven't the law of entail, which accounts for a great many of the large European holdings. We have the corporate form, under which have been built up other large European holdings, notably in Scandinavia. But if, when a man dies, we are going to take an increasingly large portion of the estate and force quick liquidation of the assets, we shall have a situation like that described by our President this morning with respect to England. I think that we, as foresters as well as citizens, are going to need to give a great deal of thought to the question: What is the form of ownership which can be used in this country to perpetuate these units for sustained yield under private direction and private ownership?

Chairman Chapman: We will move on to the next subject, "Integrating Private and Public Lands for Sustained Yield." The man who is going to speak on what public agencies should do is at the present time conducting one of the largest, if not the largest, selective logging operation that I know of. He was for a long time a member of the Forest Service. He is a forester, and I am sure has been a member of this Society for a very long period. I take pleasure in calling on Mr. Billings. He will be followed by Mr. Tinker.

INTEGRATING PRIVATE AND PUBLIC LANDS FOR SUSTAINED YIELD

I. What Public Agencies Should Do

By C. L. BILLINGS

General Manager, Potlatch Forests, Inc.

TWENTY-FIVE and more years ago our country re-echoed to the cry of timber famine. Evangelistic foresters, the first of a long line, threw figures around in a most abandoned manner in speeches and pamphlets which fairly blanketed the Nation. The reaction was, in the language of a later day, colossal. The public agencies, anxious to protect the public from exploitation, rushed into the business of creating public forests. But the thrifty citizens of the Republic, and there was the rub, were very anxious to do their own protecting. And so they rushed, about as rapidly, into the private business of owning timber. A timber famine meant a chance for a sure-thing investment. Why not? What else could it mean? Farmers, clerks, laborers, old people, young people, widows, orphans, and rugged lumbermen—all "grabbed" all the timber they could optimistically hope to be able to handle.

Yes, there was the rub. For after the grabbing competition was over the public found itself in a most awkwardly intimate situation with its own "grabbing" citizens. Many a section and township,

many a natural drainage, was found to be divided between public and private ownership. How was this unnatural situation to be handled? How were the lands to be administered and protected? How, indeed, was forestry to be practiced on these lands?

This, only one of the legacies of early enthusiasm, is the subject that is getting our attention today. It was too early then to think of these things. The only idea, public or private, was to get some more timber while the timber was still there to get.

And so began a chain of events which has brought us, foresters all, down the years to today. In natural course the famous American standard of living reached the woods communities, and pressure for liquidation became irresistible. The water from a thousand splash dams has carried billions of feet of logs from woods to mills, leaving behind heartaches for the stumpage owners who did not get rich and carrying with them headaches for tired lumbermen who had to force their boards on an unwilling market.

The lumberman, we all know it now, fell into the error of thinking the cure for his troubles lay always in volume and more volume. Right there our chance for leadership in selling the principle of selection was muffed and lost for years to follow. Perhaps we were not ready. Probably we were not. At any rate the best effort we could make was to try to hound the lumberman into leaving behind something which he thought was presently valuable, which he had paid for and owned, by gad! and which, under the good old American system, he intended to cut as he pleased. It was years before the first brave soul among us advanced the heretical idea that what we wanted the lumberman to leave behind was stuff that he was losing most of his money on anyway.

It was more fun to call names. We said "private", "plunderer", and later on "denuder" and "devastator". And what the lumbermen replied is still ringing in our ears.

And so, as I have said, from this background of conflict and controversy the years have brought us to today. And for my short while I am to strut upon this little stage and tell you, as only a private operator can tell you, what the public should do. In a few minutes I am to be followed by an officer of a public agency who will tell you, as only a public official can tell you, what private operators should do. This sort of approach has been typical long enough. It is time that in the essentially mutual problems of forest management, negotiation and conference should displace recrimination; constructive suggestion should displace fault-finding; and business and engineering considerations should displace evangelism.

It was after this manner that cooperative forest protection has developed its fine record. Private operators and public agencies, private foresters and public foresters, are proud of that record. There is little else in American forestry in which they can, jointly, take pride.

We are discussing this afternoon, in the creation of cooperative sustained-yield units, a subject just as definitely specific and concrete as the protection of forest properties from fire. The benefits will be as widely distributed in the one as in the other. The one is as necessary as the other in the discharge, by both public and private timberland owners and by operators, of those social obligations inherent in ownership which in the last few years have been brought so often to mind. And the one, no less than the other, will be worked out finally in the negotiating and conferring, by informed people, of agreements couched in specific terms to cover specific areas.

I say this from my firm conviction that our subject does not offer another opportunity for those who like to see the government "bargain" with the industry. The rainbow of *quid pro quo* held out so temptingly in early Lumber Code days need not be dragged out again. For this is not an industry matter.

Instead, it is a matter for contract. What is needed is permissive or enabling legislation by the public, to be followed by the negotiation of contracts between the public agencies and individual private operators for the management of those definite areas in which individual private operators have engaged themselves in business, have made their investments, erected their facilities, built up their organizations, and created dependent communities.

In these areas, in the West at least, there is usually a badly mixed land ownership situation. Most of these situations, for a variety of compelling reasons, cannot be straightened out through land and timber exchanges. Most, or all, of these areas must eventually, for lack of assurance as to future availability of public stumpage, be cut in the good old rugged way which discards or ignores existing social values. There is no possible way to take care of these social values except by centering the management of these lands in the hands of the particular private operator, under such safeguards, in the public interest, as the concerned public agency can induce the operator to accept.

The public agencies should secure the passage of legislation permitting the establishment of cooperative sustained-yield units. The enabling acts should be broad, not narrow; general, not detailed in language, so that the agency may not impose such conditions upon itself and its prospective private cooperators as to make agreements impossible to negotiate and thus render useless the entire endeavor.

The public agency will serve best, I believe, if it centers its efforts on the fixing of the cut for these units at amounts commensurate with their growth capacity, present operator needs considered. Many useful appendages to this main idea will develop as a matter of course—for instance, fire prevention, insect control, standards of utilization, etc., all to be applied alike on private and public land. But indefinite frills and whims and "discretions" of doubtful value to the public and of undoubted expense to the operator had best be left out.

The private operator will expect to assume definite contractual obligations, and will expect the public to assume obligations no less definite. The operator will expect to become a party to a contract in which these things will be definitely agreed upon:

A definition of the area involved.

A figure for the annual growth of the unit.

A figure for the annual cut from the unit.

A method for appraising public stumpage values.

A time interval for re-appraisal of these values.

A time period for the life of the agreement.

An assurance that public timber in the unit will not be offered for competitive bidding, but will be held for the operator to cut in an orderly scheme.

The public will expect of the operator, and he will agree, that his lands are to be handled or managed just as are the public lands as to methods of cutting, disposal of slash, protection from fire, and other essentials. And the operator will contribute his experience, capital, facilities, and organization to the carrying on of the joint venture.

This is the basic situation as I see it. In the long, long pull in American forestry it may very well develop that this

present ownership-management situation is only a passing phase. Perhaps we shall do ill to our cause if we try to regulate and manage for too long a period into the future. After all, the pressure to solve this problem comes harder from social obligations than profit or forestry ambitions. The attempt to negotiate contracts after the enabling legislation is passed will no doubt disclose many difficulties. In some places local tax requirements may be too severe to permit long-time management of private lands; in another, the debt requirements of the private operator may make it imperative that he liquidate with all speed; in another, the public forester-negotiator may insist on trying to adjust the cut from a unit on the basis of theoretically balanced growing stock instead of on the basis of the timber as he finds it (the switch to an all-time balanced cut need not necessarily be made during the life of the first contract); in another, the operator's ideas of depreciation of existing facilities may be too tough to be easily reconciled to a reasonable annual cut. These things are important, all of them, but they are not basic. I am of the opinion that there is no way to take care of them before enabling legislation is secured. Afterwards they may not prove too difficult.

In the time allotted to me I have tried to bear down hard on the proposition that this matter can be worked out, not on a sentimental basis, but only on a profit-making business basis—profit for the operators as a return on investment, and profit for the public stumpage owner in coupling raw material with operators' capital for long-range management.

But I trust that we all believe—that we all know—that in our efforts today we are striving for a much finer goal. Community life in the forest industries need not always be insecure, and woods and mill labor need not forever be migratory. If we can work this thing out, we can fasten the American standard of living onto the people in our industry, and keep it there. And that's a challenge to every one of us.

INTEGRATING PRIVATE AND PUBLIC LANDS FOR SUSTAINED YIELD

II. What the Private Operator Should Do

By EARL W. TINKER

U. S. Forest Service

I OWE you an apology. I prepared a paper on "What the Private Operator Should Do", but I found it so integrated with the discussion this morning, and with the discussion that took place in this city last week at the Western Forestry Conference, that I have taken the liberty of discarding it, and am now assuming the risk of presenting extemporaneously the viewpoint of the Forest Service, and my own.

A meeting of the Regional Foresters of the Forest Service was held in the city of Washington two weeks ago. I had the privilege of presenting to that meeting the policy of the Forest Service with relation to private forestry practice and the retention of forest lands in private ownership for that purpose. I used as the policy of the Forest Service a long established policy—a policy that clearly indicated that private ownership of forest lands was desired, and that private ownership and private forestry would be fostered to the maximum degree consistent with the public interest. As far as I

know, that policy has not been changed up to this time. If you, as foresters, will accept this as the policy of the Forest Service, and if the private owners will accept it, then I believe a good deal of misunderstanding that apparently exists will have been done away with.

Last week there was a good deal of criticism of the action of public agencies along several lines, possibly some of which were justified, but one of which was given particular emphasis—that public agencies in their publicity have put the industry and the timberland owners in a false light and have created in the public mind the very distinct, but erroneous, idea that forest conservation has all the implications of forest preservation. It was contended that the industry has been put on the defensive from this idea that it, as a harvester of forest products, could not be carrying on operations that were in the public welfare. If this is true, we as foresters might well look to our publicity; because certainly the proper harvesting of forest products is included in the fundamental tenets of the profession of forestry.

With respect to the integration of private and public timberlands, I find that I am nearly one hundred per cent in agreement with the previous speaker. I have had considerable experience along this line, and have found that, upon analysis of individual situations, the practical limitations under which the private operator is placed become obvious, and a reasonable meeting of minds could generally be obtained without the sacrifice either of the public or of private interests.

The discussions in this meeting have been convincing with respect to the desirability of using public ownership to foster the public-agency objective of getting maximum practice of forestry on private lands. Such a plan is a business arrangement, and certain fundamental things should be included in agreements. The items I have listed for inclusion are practically identical with those the private agency representative has presented to you here today. They involve—

1. The acceptance of a reasonable management plan as a requirement in planning the operation.
2. The establishment of definite cutting cycles.
3. The determination of the order of cutting to be followed.
4. The establishment of definite limitations of the periodic cut.
5. The acceptance on the part of the private owner of the policy of maintaining in his ownership the maximum acreage that he can carry.

These requirements are simple, and the development of agreements appears to be a workable and desirable plan. It should be recognized that such agreements and plans are mediums to obtain permanent production from public and private forest units and the promotion of the public welfare with all its implications, both social and economic.

May I cite, as illustrative a case of integrated planning which involves a considerable investment of public funds in private forest lands in two counties in the state of Michigan? These two counties have a considerable stand of highly valuable virgin timber. After an analysis, I requested the major owners of these timberlands to meet with me and discuss the possibilities of getting sustained yield and good forest practices upon their holdings. Out of these discussions was developed a plan of integrated private and public holdings which involved the purchase of a considerable acreage of private timber. The private owners, without an exception, agreed to accept the plan in principle, provided individual consideration to their situations, financial and otherwise, would be given. In this case, from the standpoint of the public, there were just two alternatives that could be

adopted. The process of liquidation could be permitted to proceed and the private owners left to work out their own salvation, which would have meant the practical liquidation of the entire enterprise within about fifteen years. It happened that around twenty thousand people were, directly or indirectly, dependent upon these operations, and the forest industries were the only industries that remained in the region as a possible source of employment and support of this population, except the usual recreational industries inherent in a forest country. The plan for these two counties was presented to and approved by the National Forest Reservation Commission. Unfortunately, inadequate funds have, up to this time, prevented its consummation. I see no place for controversy between the public and private agencies in an instance of this kind. It may be contended that public ownership should not have entered the picture, but if it does not, or if some other form of control is not adopted, the last possibility in the state of Michigan for a large sustained-yield operation, and for the support of the people employed in that lumber industry, will disappear.

Certainly it is not in the public interest to see this industry unnecessarily eliminated from the picture, with the accompanying opportunities for employment and for continuous production. In this particular case, the fundamental policy was to have the private owners carry the maximum acreage that could be carried in their individual circumstances.

In connection with the public interests involved in circumstances of this kind, I believe that private owners must accept the fact that it is distinctly not in the public interest to see the local political units, in the form of counties and communities, disintegrated because of the liquidation of the resources of these counties, and the dumping back upon them of the exhausted lands. It appears clear that this ought to be accepted by private owners, as well as the public, as contrary to the public interest. There are other values involved, such as streamflow, recreation, erosion, and those elements that go with a managed forest and with sustained forest production.

We have reached the conclusion that the answer to the problem is not through further generalizing, but through an analysis of individual situations as they exist, and the reaching of agreements with owners, either as cooperative groups or individual owners, to determine what should be done, and then putting the agreements into effect. That seems to be a sound approach, and that is the approach of the Forest Service today.

We ask of the private owners of timberlands that they approach this problem with an open mind. We ask that they accept certain public responsibilities, as owners of land which is capable of producing wealth and giving employment. If these conditions exist, we should be able to keep a very considerable acreage of forest land permanently in forest production under reasonable forest practices. I believe that this can be accomplished if private owners will accept their responsibilities; and we, as foresters, should meet them half-way and recognize the difficulties of their individual situations.

What has the Forest Service done to aid in carrying out its own policies? This morning there seemed to be a good deal of question about this. What has been the purpose of the Clarke-McNary Law? What has been the purpose of the cooperative fire protection that has been in existence for several years? What has been the purpose of the tax inquiry and the federal expenditures in studies along this line? What is the purpose of our discussion of forest credits and the obtaining of a credit structure that will enable private undertaking of the production of for-

ests? It seems to me clear that the history of the Forest Service and its endorsement of policies of the kind mentioned indicate the trend of the Forest Service and its serious intent to encourage private initiative in the maintenance of forest land in a productive condition.

One more point, and I am finished. The Forest Service has long had the policy that in so far as the states will and are able to undertake the management of forest lands and accept the full public responsibilities of the forest problem, the Forest Service desires that this be done. This has long been the policy of the Forest Service, and it has not changed. However, it should be recognized that there is a federal responsibility, because public welfare of interstate import is concerned. This has been the basis for appropriations under the Clarke-McNary Law. The fact that these appropriations have been inadequate does not alter the policy involved. The Clarke-McNary appropriations are inadequate, and particularly in this Region there is an element of pathos as far as an outside observer, somewhat informed on the situation, can see, in that with forest production forming such a vital part in the economy of the Region, and with forest enterprises employing such a large percentage of the people, such relatively insignificant state appropriations are made available in recognition of the responsibility that rests with the state.

It has been, and is, the aim of the Forest Service to strengthen the position of the State Foresters in so far as this is possible, and by every means that we can legitimately use, to place them in a position where they can fully redeem their responsibility. I would leave these two thoughts: that the Forest Service would like to see the maximum assumption of the production of forests from private lands that can be obtained, and would like to create a situation making forest production by private initiative an attractive economic enterprise. The Forest Service will expend every energy to bring the states to a full recognition of their responsibilities with respect to forest land and the public welfare.

DISCUSSION

Dean D. S. Jeffers: A thought came out of the meeting this morning that has been emphasized this afternoon, which I think we should all take with us: the responsibility that goes with ownership. It has been called a social responsibility. As was suggested this morning, it may not be part of the political or economic program of a frontier nation; but given a due sense of the responsibility of land ownership—it makes no difference whether it is social, economic, or political—there would not be now in the corn belt a new agricultural program, neither would there be a dust bowl in the Great Plains region, neither would there be hordes of individuals moving out of various parts of the country. There probably would have been no need for a T.V.A., or for a resettlement program in other sections of the country. Responsibility of ownership is tied in with sustained yield; with what the public should do from the standpoint of the private individual, and what the private individual should do from the standpoint of the public. There are responsibilities of ownership that go beyond the philosophy of profit. They are fundamental in the maintenance of this thing we call the United States of America, and we as foresters share the responsibility.

Mr. Mason: I think the two papers by Lee Billings and Earl Tinker ought to be considered together. I never heard a finer and better or more clear-cut statement of the private point of view and the Forest Service attitude. I think that those two statements taken together form a splendid platform on which to go ahead with this movement.

Mr. P. M. Barr: I enjoy the unique privilege of being a member of the faculties of the University of California and of the University of British Columbia; and I maintain a lively interest in those less fortunate communities that serve as a connecting link. I should like to suggest a matter which it seems to me has received very little attention in our development of forestry thought and practice in North America, and that is the relative importance of particular and general.

Most of what has been written and what has been said in regard to forestry during the past thirty years has been of a general nature. We know the unhappy results of that, in the development of scientific knowledge. Until the seventeenth or eighteenth centuries men confined themselves almost entirely to discussion of principles, with little attempt at practical application. The work which was being discussed was largely that which had been done by Aristotle, and public and private agencies engaged in lively controversies on the old subject of how many angels could stand on the point of a needle. Since that time the scientific method has been applied, and thousands of individual problems have been attacked and solved, not on a question of prior theories but on actual conditions. Five years ago it fell to my lot to attempt to teach the subject of forest management, including sustained yield, and I found that while a great volume of principles existed in text books, some of them apparently of Aristotelian days, not much could be learned of actual practice.

In going about the country during the past four or five years, however, one finds that there are many excellent examples of sustained yield, although we know very little about them. To one trying to be an impartial observer, it has seemed a pity that such a comparatively little effort on the part of members of the profession as a whole has been directed to an examination of what is being done in these instances. We know that in the South, at the Harvard Forest, at the Eli Whitney forest, in Maine, in the Pacific Northwest, and several properties in California, sustained yield is a factor. I should particularly like to submit, with temerity, that we could gain much if we ceased in part our discussions of sustained yield and studied the progress which is being made in overcoming the obstacles that lie in the way of sustained yield on these definite properties where so much progress has been made, of which we know so little.

Members of the industry in the United States came back from their Oberlaender tour in Europe filled with enthusiasm for the possibilities of sustained yield in this country. That enthusiasm was aroused not by theoretical considerations but by a fortunate opportunity to see sustained yield in practice. My only suggestion is that a weak link in our forestry practice could be immeasurably strengthened if we attempted to enlarge our practice of sustained yield by increasing, through cooperative effort, the number of properties in which sustained yield already exists and is making remarkable steps toward success, due in large measure to the energy and vision of the private owners who are concerned.

Chairman Chapman: We will pass on to the next paper.

Mr. A. J. F. Brandstrom: After listening to the discussion this afternoon on sustained yield, having particularly in mind Mr. Woodbury's statement regarding the need of heavy cutting in our virgin stands in order to get a high rate of growth, and Mr. Cowan's statement about starting on cut-over lands in order to achieve sustained yield, I believe the paper that I am about to present will give material for a spirited discussion.

THE ROLE OF SELECTIVE CUTTING IN PROMOTING SUSTAINED YIELD, WITH SPECIAL REFERENCE TO PONDEROSA PINE

By AXEL J. F. BRANDSTROM
U. S. Forest Service

IN THE uneven-aged virgin ponderosa pine forests of eastern Oregon and eastern Washington are found trees of all sizes and ages and in all stages of development, from thrifty young "bull" pines to overmature veterans several hundred years in age. Some are growing relatively fast, others exceedingly slowly. Some are of high value, others of low or negative value. Some are growing in the open, others in overstocked clumps. Here, in brief, are found wide variations both from the silvical and from the economic point of view—important differences in present value and in present and probable future earning power as influenced by growth rate, risk, and life expectancy.

It has long been recognized that the most effective method of cutting in these forests is selective cutting of one form or another. Clear cutting is, in fact, rarely if ever practiced in them today, even on private holdings which the owner intends to abandon after the cutting. Selection as now practiced, however, is not far removed from clear cutting. Heavy cutting involving removal of 80 per cent or more of the ponderosa pine portion of the original stand is the general rule, both on privately owned lands and on National Forests—on privately owned lands generally in the form of cutting all trees except those without value, and on National Forests in the form of a silvicultural selection system.

It has been felt by many that a much lighter initial cut followed by light and frequent return cuts would prove beneficial from a forestry point of view and at the same time bring greater immediate income from the forest. Recent developments in logging methods, represented by tractors, motor trucks, motorized log loaders, and road-building equipment, have done much to bring this thought to the fore. No longer are the exigencies of logging such that heavy cutting must be tolerated as the only practicable operating method. And so, in considering the uneven-aged ponderosa pine forests, the questions naturally arise: Is heavy cutting the right answer to the management problem? Is it the most effective method of liquidation? Is it the proper treatment for promotion of sustained yield?

Recognizing the need of finding the answers to these questions, the Pacific Northwest Forest Experiment Station started in the summer of 1935 a comprehensive investigation in the economics of ponderosa pine management. One part of this investigation was completed a few months ago—the so-called Hines study, in which the Station had the close cooperation of the forest engineering firm of Stevens & Bruce, acting for the Edward Hines Lumber Company, and of the Regional Forester's office. This was a comprehensive case study covering all important phases of forest management for a large area of National Forest timber in eastern Oregon. It has attracted a great deal of attention owing to the fact that,

as one of its results, a large-scale test of light selection is now being made on the Hines sale area. I will discuss this study at length, both because it is important as an individual case and because it throws light on the forest-management problem for the ponderosa pine region as a whole.

Description of Study Area

The forest area involved in the Hines study is situated right in the heart of eastern Oregon, between Burns in Harney County and Canyon City in Grant County. It is one of the largest continuous areas of virgin timber to be found anywhere in the ponderosa pine region. It totals nearly one million acres. Interspersed with open range and semidesert areas, this timberland extends into about 80 different townships. Famed for its splendid deer hunting, and with stock raising as its only major industry until a few years ago, it is now the source of log supply for the mammoth Hines sawmill at Burns.

The timber volume on the area totals about 10 billion board feet. Of this amount 8 billion board feet is in uneven-aged virgin stands of practically pure ponderosa pine, which occupy about 700,000 acres. All but 15 per cent of the total volume is owned by the federal government, being included within the Malheur and Ochoco National Forests. This federally owned timber is being managed on a sustained-yield basis, under the standard Forest Service selection system of cutting. Under this system an average of about 85 per cent of the ponderosa pine volume is marked for removal. The aim is to leave as a nucleus for future cuts only thrifty and silviculturally desirable trees that are judged to be capable of surviving a 60-year cutting cycle.

The Study and Its Results

The purpose of the study, to state it briefly, was to ascertain whether this system of selective cutting or some other is best adapted to the area. To find the answer to this question required investigation of the effect of tree size and quality on grade recovery and on production costs both in the milling and in all phases of the logging operation, and a comprehensive sample-plot study of the entire forest area that would show the relative occurrence of trees of various diameters, by tree classes and value classes, and make possible determination of growth and money returns under different systems of cutting. Much of the information required was already available in published form, notably the results of Meyer's studies of growth in selectively cut ponderosa pine, Keen's studies of mortality losses caused by the pine bark beetle, and studies of slash disposal and other aspects of ponderosa pine management by Munger and others.

From an analysis of the data was evolved a system of light selection, which is now being tried out on an area of about 12,000 acres where logs are being taken out at the rate of nearly half a million board feet per day. Based on the financial and biological maturity of the trees, this system may well be termed a "maturity selection system".

Under this system an average of about 40 per cent of the stand volume is removed in the initial cut. The marking is based primarily on selection of high-value overmature trees, which, according to the study data, constitute on the whole the least productive element of the stand. Exceptions to this rule are provided for by excluding from the cut high-value trees of unusual thrift and vigor and including

in it certain low-value trees of very poor vigor. So close is the correlation between financial and biological overmaturity that about 90 per cent of the cut, as indicated by careful sample markings, is obtained automatically by applying a marking rule based on selection of trees above a given minimum value. The silvicultural character of this timber is in a general way indicated by the fact that none of it is in age classes under 150 years, and that of the 300-year and older age class all but 20 per cent, by volume, consists of trees selected for their high value, and 5 per cent or so consists of trees marked for salvage. It is principally through the decay and death of trees 300 years old or older that the growth of the unmanaged virgin forest comes to nought. Removal of such trees converts the stagnant forest into a productive one.

Results of Light and of Heavy Cutting During First Cycle

From the standpoint of effective liquidation this cutting system promises gratifying results. The net stumpage realization per thousand board feet during the first cutting cycle, as predicted in the study analysis, is nearly twice as high as under the present system of heavy cutting, and it appears that a further increase may be effected through adaptation of the road system and operating methods. Naturally, there are various uncertainties in these predicted results that can be settled only by experimentation and experience. This fact is one of the reasons for the large-scale cutting experiment now under way.

From the standpoint of future timber production and attainment of sustained yield, the prospective results are equally gratifying. Here too, of course, uncertainties exist as to the results both of the light cut and of the heavy cut. So far as the first cutting cycle is concerned, the indicated superiority of the light cut is due partly to preservation of a far heavier volume of productive growing stock per acre, and partly to the fact that cutting extends over the entire area with greater rapidity and thus puts more acres into production within a given time.

On a per-acre basis the estimated net annual increment is 72 board feet for the heavy cut and 94 board feet for the light cut. The former is produced from a relatively fast-growing reserve stand of about 3,000 board feet per acre, including about 1,000 board feet of species other than ponderosa pine, and the latter from a very slow-growing reserve stand of nearly 10,000 board feet per acre with the same amount of other species. It is obvious that to select the reserve stand on the principle that only fast-growing trees should be kept does not lead to attainment of maximum growth per acre.

On the forest as a whole, for each 72 board feet produced by the light reserve approximately 200 board feet are produced by the heavy reserve, owing to the greater area covered by the latter; in other words, production from the heavy reserve as a whole is roughly three times as great.

The heavy reserve stand has another important advantage: its average value per M is greater, and the value of the increment is greater. Calculations thus indicate that, while the volume increment is three times as great, the value increment is more than five times as great. It is significant that this strikingly superior value increment is obtained through a system of cutting that extracts money from the forest at about twice as high a rate.

Comparison of Sustained-Yield Possibilities

These results, as has already been stated, apply only to the first cutting cycle, which for the 40 per cent cut would extend over a period of 29 years. Thereafter up to the end of the sixtieth year, by which time the heavy cut would have extended over the same total acreage as the light cut, the difference in current increment between the two systems would gradually decrease. But the twain would never meet. The initial gain would become a permanent gain, in the form of a larger and more valuable permanent growing stock and hence a larger and more valuable sustained-yield cut. The study data disclose that at the end of the first cutting cycle, i.e., at the end of the sixtieth year, the heavy cut would have depleted the original 10 billion board feet of growing stock to approximately 5 billion board feet. A very drastic reduction of the cut would then have to be made in order to preserve sufficient growing stock to carry on. Under the light cut, on the other hand, assuming that the first 29-year cycle would be followed by a 31-year cycle during which the cut would be maintained at the initial rate, at the end of the sixtieth year the growing stock would total about 6½ billion feet, and thus less drastic reduction of the cut would be required. By making a moderate reduction of the cut after the completion of the 29-year cycle, as could readily be done, since the high-value overmature timber would have been liquidated, and by shortening the succeeding cutting cycles, as would be easily possible with a road system already built, apparently a growing stock of 7 to 8 billion feet would be made available at the end of the sixtieth year, with a productive capacity sufficiently great to maintain that cut indefinitely. Because of the greater timber-producing capacity of such a stand as compared with a 5 billion foot stand and the greater value of the timber produced, it may well be that 60 years hence the whole question of sustained yield or no sustained yield for this million-acre forest will depend entirely on the presence or absence of the additional 2 to 3 billion feet of growing stock.

In this comparison of results in the far-off future, there is another aspect to consider: namely, the possibility of effecting gradual site improvement through return of the slash to the soil. Under heavy cutting, present requirements are to pile and burn the slash as a measure of fire protection for the residual stand. Under light selection, removing on the average only about 4 trees per acre, slash disposal is not deemed necessary except along main roads and other strategic locations. In view of the pitiably low productive capacity of this arid territory, as disclosed by the foregoing growth data, this fact has great importance. Through the creation of a duff layer to hold moisture the productive capacity of this forest area may in the course of time be raised in very considerable degree.

Summary and Conclusions

To summarize, then, the conclusions of the study are very distinctly in favor of the light cut. The light cut would be far more effective in liquidating the generally decadent high-value elements of the stand; in this respect it may properly be termed a salvage cut. It would be far more effective in putting the forest area as a whole into a productive condition without disastrous depletion of the growing stock, and thus would lay a more substantial

foundation for sustained-yield production. It would serve to maintain natural forest conditions and, through return of the slash to the soil, to build up the productive capacity of the land. Obviously, too, though this is not discussed in the foregoing, it would lead to rapid creation of a road system that would facilitate fire protection, salvage, insect control, or any other phase of forest management that requires operating control of the growing stock; and a road system that would make possible further shortening of the second and succeeding cutting cycles.

Although the cutting plan here discussed specifies an average removal of 40 per cent of the stand, there is every indication that it would be feasible to take a still lighter cut and to correspondingly shorten the cycle. The 40 per cent cut was recommended on the basis of a very conservative interpretation of the study data, in the belief that in taking this first step toward light cutting it would be best to proceed cautiously. The indications are that if the railroad-spur system were adapted to a light cut, an initial cut of about 20 per cent would be the most profitable; and that if motor-truck haul were substituted for a large part or all of the railroad-spur haul—which is a very promising possibility that is now being explored through large-scale trial—an initial cut of 10 to 15 per cent would be the most profitable. In any event, from the standpoint of effective liquidation the basic principle is that for all practical purposes the best initial cut is the one giving the highest stumpage realization per M after deduction of the cost of the road system. From the standpoint of effective forestry, the basic principle is that the best cut is the *lightest* cut; in other words, the ideal course would be to spread each year's cut over the entire forest and to remove in each cut those elements of the stand that are most urgently in need of removal. To appreciate the truth of this, one need only look at the tragic record for this region during the 15-year drought period just past; during that time, because of lack of operating control of the forests, billions of feet of valuable old-growth ponderosa pine were lost through the ravages of the pine beetle.

Obviously, then, the most effective management procedure for this forest area would be to go through with the lightest feasible initial cut, at the same time constructing a road system and thus establishing operating control of the property; and from then on, to exercise that operating control to the full extent that may be needed. This might mean establishing a very short cutting cycle and intermittently departing from the cycle for purposes such as salvage and beetle control. Substitution of motor-truck hauling for railroad-spur operation, and the flexible skidding and loading methods now available, make it possible to go very far in this direction. Certainly it seems unnecessary to assume that a 30-year cutting cycle is the shortest that would be practicable. For the initial cut a cycle half that long may easily be feasible; and in the return cuts one may expect to get even shorter cycles.

The foregoing, applying specifically to the Hines sale area, applies in principle elsewhere. The details of selection, to fit specific conditions, vary from area to area and need to be worked out through careful study for each individual case; but the fundamental principles of the cutting system discussed are applicable throughout the virgin ponderosa pine forest area.

For the private timber owner who has only a short-time supply of timber which he wishes to liquidate, this method of forest management is not directly applicable. So long as he looks only to his own property, the only feasible course may be to approximate zero-margin selection. However, through cooperative agreement or direct exchange of timber between the Forest Service and the operator, it will be found feasible in many cases to apply to these private lands a selective cutting system similar to the one here discussed. Such an agreement or exchange would involve taking only a light cut—say, 30 to 50 per cent—on the private land, after which the private owner would transfer his operation into nonoperating Forest Service timber for the removal of an initial cut of overmature growing stock, for which he would exchange his residual stand. In this manner two purposes would be served: (1) the private timberlands would be kept productive, with heavy growing stock; (2) the now nonoperating Forest Service lands would be brought into production at an earlier date. Considering the economic as well as the silvicultural advantages of the proposed cutting system, it should be feasible to work out such a program on a large scale. The regional interests would clearly be served by the increased revenues that the selection of overmature timber would bring at the present time; and they would be further served by the greater production that such a cutting system would obtain from lands now nonproductive. This program would in effect put the Forest Service into a position to use its now idle timber capital for acquisition of private forest lands.

DISCUSSION

Colonel Greeley: What is the average loss factor in the residual land under this type of light cutting?

Mr. Brandstrom: About four-tenths of one per cent annually. That is all forms of loss, insects, wind throw, etc. If we have a continuation of insect epidemics, we may have a larger loss.

Mr. Myron Krueger: Could an operator who is not interested in sustained yield obtain desirable results from this method, by conducting a cut in two cycles?

Mr. Brandstrom: Yes, I think he would be interested. If he has a timber supply for 15, 20, or 25 years or so, I believe it feasible to at least take two cycles before the stands are given up. That is with the cutting cycles and with the operating methods that are available.

Mr. Krueger: In that statement, do you include again cutting off, or letting it go?

Mr. Brandstrom: Yes, I'd include that.

Mr. L. T. Murray: Would such a job be feasible at all under a set-up with a fair proportion of privately owned land, and if so, what allowance would have to be made, on what we know at this time? Would that kind of a set-up affect taxation assessments such as we know today?

Mr. Walter H. Meyer: As I understand, this set-up of a million acres is on Forest Service land.

Mr. Brandstrom: Yes, all but 15 per cent is Forest Service land. In case a private owner had the whole area, he could liquidate it within 20 or 30 years. I don't know whether we have any in-

stance where a private operator has an 80-year supply ahead of him. If he had an 80-year supply and operated it on that basis, the principle would apply, particularly in the ponderosa pine region, since the carrying charges are carried by the grazing value of the land. Several factors are involved in that, regardless of how residual lands are taxed and whether the tax would be reduced in proportion to the value, as it should.

Mr. Meyer: I think Mr. Brandstrom has to go a little further to convince us that this could be done in a private way.

Mr. Brandstrom: It could be done if the private owner waited 80 years to liquidate the tract.

Colonel Greeley: What proportion of your investment would be affected if you liquidated in the first cut?

Mr. Brandstrom: The investment would be in your light cut over your heavy cut; if you discount the value of your return from a 29-year cut, the 40 per cent cut has a greater present value than the return from the 85 per cent cut. The actual money amounts are about 15 per cent higher for heavy cuts, but on the light cut you get your money in 29 years, and on the heavy cut you have to wait 80 years.

Mr. E. C. Rettig: In making your study, I presume you have recorded just what diameter limit you can cut to, have you not, and produce a profit?

Mr. Brandstrom: In making the initial cut the diameter limit depends upon the type of tree. For the first cutting I think the diameter is from 22 to 30 to 35 inches.

Mr. Rettig: Below the present line, does your study show you can't take trees out at profit?

Mr. Brandstrom: You can't "take out at a profit." The only principle involved is taking out the highest-value timber.

Mr. Rettig: Then certain types of trees cannot be taken out at profit?

Mr. Brandstrom: Yes, but a very small proportion, about 5 to 10 per cent. Those small-diameter trees, low-value trees, don't constitute a very heavy percentage of the volume.

Mr. Rettig: We made a study recently on our own operations in Idaho, on ponderosa pine. We took out what we call the bull pine type, which is not surface-clear, and found a difference of $3.39 a thousand in the logs selected last year. We found the difference this year was $7.19 a thousand; this was on low-value trees. We couldn't at this time cut them at a profit.

Mr. T. D. Woodbury: We started out a good many years ago with very light cutting. That was the first conception of the proper cutting, about 55 or 60 per cent of the stand. We have been following that cutting through on sample areas, and we found that we had some extremely heavy losses. After a period of 25 or 30 years, we had very little net increase. I think this discussion of Mr. Brandstrom's is exceedingly interesting and pertinent; we are trending toward the same thing, but not going so far.

Perhaps that applies to the difference in silvicultural conditions. We have tried out experiments in light cutting in recent years on ponderosa pine, but it has been impossible for us, as foresters, to make what we regard as a good silvicultural cutting and cut any more than around 65 or 70 per cent of the stand. It occurs to me that if we want to go a long way in the future we must expect that, unless this system is applied quite uniformly, the

man who cuts heavily on the present accepted silvicultural basis is going to have the best of us at the end of the first cutting cycle; he is going to have higher-quality stuff than the man who skims over the land.

I would like to hear something about the practicability of applying the general rules on the ground, by the type of men who do our marking. It seems to me it is rather easy to follow silvicultural rules in marking, but to mark purely on an economic basis seems to be a difficult thing.

Mr. Brandstrom: Mr. Woodbury brought out several interesting and important points. One is in regard to what has happened in reserve stands during the last 25 or 30 years, in pine. During the drouth period losses have been heavy in both the light stands and heavy reserve stands. Since the virgin forests have lost perhaps an average of 15 to 20 per cent of volume in eastern Oregon, the fact that the reserve stand that was cut lightly 15 or 20 years ago may not have progressed does not signify. We have to base our figures on the normal growth period. I could even conceive of a situation where you left a stand like this 15 or 20 years ago and kept it for 20 years without any net growth. But what about it? If you kept the virgin forest instead, you'd have lost 15 or 20 per cent. It works in either case.

Now, regarding the question of finding men to do the marking for this type of cut—I don't think that is difficult. The last two or three months 12,000 acres have been marked under this system. The checks on that marking show a good many errors, but in aggregate they only amount to 10 cents per thousand. That is the estimated difference between the value of the cut as marked by the markers in the field and what could have been done.

Of course, you have a different principle in marking initial cut than you will have in later cuts. In initial cut, the main basis for marking is high value of the mature timber. When you come to succeeding cuts, you will more and more deviate from a value basis toward a silviculture basis. The marking will become less and less distinct as you work on a high-producing element of the stand. In dealing with unproductive elements of the stand, you have a very high correlation. The marking that is being done is done on the basis of a grading rule, diameter specified for different grades of trees. It is based on the butt log and second log. Then we deviate from that rule to take care of the trees of high value that you should not be cutting on account of their thrift, and also for marking low-value trees that should be taken regardless of their low value. That is down to the zero value.

Mr. F. P. Keen: I have been very interested in this problem on account of the ravages of the pine beetle, which is my particular problem. I would like to call your attention to these two charts in the rear of the room, contrasting the purple color with the orange. The orange is beetle loss in the last 5 years as compared with the timber cut. In the chart to the left, the orange is compared with the timber cut, about the same amount, and the column ahead of that is the growth that has been made. Timber cut plus the beetle loss has been about four times the growth of our ponderosa pine.

Now, I am heartily in accord with this suggestion of Mr. Brandstrom's in regard to selective cutting, as far as it goes in making a first step in what we might consider the shelterwood system. There

are other problems, however, that confront us when we consider the second cut, Just what are we going to have on our hands at that time? I think some of the points that have been brought up here are of particular interest to us, and that there are technical problems that still remain to be solved before we can say what sustained yield is. Certain technical questions come into the picture very forcibly. That first cut that Brandstrom mentioned left a great many intermediate and codominant and suppressed trees that are making a very poor growth. As to the growth predictions on that remaining stand, I am very much afraid that a great many highly beetle-susceptible trees are going to be left in the stand, that are going to cause such heavy mortality as to cut down greatly the final net growth.

There are some considerations there that haven't been fully met. I really don't know just where we are headed at the present time. It is hard to answer some of these technical questions on just where we should go in sustained yield.

The afternoon session then adjourned.

MEETING OF THE DIVISION OF FOREST EDUCATION

MONDAY EVENING, DECEMBER 14, 1936

THE third annual meeting of the Division of Education of the Society of American Foresters was called to order at 7:30 p. m. by Henry Schmitz, Chairman.

Because of the absence of the Secretary, the minutes of the second meeting of the Division were not read.

H. H. Chapman read a paper entitled "Provision for Minimum Instruction in Forestry as a Standard for Admission to the Grade of Junior Member of the Society of American Foresters". (Printed in full, JOUR. FOR., 35: 40-50). Mr. Chapman then made the following statement: "The chief purpose of the paper I read was to propose a plan whereby the suggested minimum requirements might be set up. That plan is not perfect, and probably not acceptable to the Society in its present form. This is immaterial. The question at issue here is simply whether we should follow the procedure adopted by the legal, medical, and other professions, where the professional group analyzes the curricula of its respective schools and prescribes a minimum course of studies for membership in the professional groups.

"I wish to present this proposal to the Society for its consideration through the proper channels, the first opportunity of which is afforded by this meeting. The Council has, under a by-law of the Society, the power and right to decide that certain curricula in certain schools do not qualify a graduate for Junior membership in the Society. The Council can exercise that power, but it has deliberately postponed making a decision. Graduates from any school up to and including 1936 are admitted on their diplomas; but subsequent graduates of schools not yet accepted must make up certain requirements before they will be admitted to Junior membership."

Mr. Schmitz suggested that reports of committees be presented before proceeding with the discussion of Mr. Chapman's paper, because these reports may have a bearing on the problem outlined. The following reports were presented.

REPORT OF THE COMMITTEE ON SPECIALIZED CURRICULA

IN the Committee report presented at the last annual meeting of the Division, the opinions of the members of the Committee were presented in answer to questions concerning the field of forestry, what constitutes specialization, and when it should begin. This report, published in the March 1936 JOURNAL, brought no comments from Society members as the Chairman had hoped.

Simple variants from the general training in the management of forest areas, or an opportunity for selection of courses to a limited extent only, cannot be considered specialization. Such a variation may provide only for a certain degree of flexibility in an otherwise rigid curriculum, so that the student may focus his attention on one phase of forestry preparatory to graduate work in that line or to concentration in his senior year on a subject, such as forest entomology or wildlife management, because of his particular interest in it.

On the other hand, if undergraduate training diverges sharply from the broad course in training in order to prepare the individual to be specifically trained, as in the field of forest products, for example, or in landscape and recreational management and other similar divisions of the field, it may be termed specialization.

Educators must adapt their minds and

their programs to the broadening concept of the field of forestry. It would be unfortunate if rigid parallel lines or boundaries were laid down to exclude the possibility of variation and adaptation of training to the needs of the profession in all its ramifications.

The older generation was trained primarily in management of the forest solely from the standpoint of production of timber and other useful materials. There is still that point of view, with the accompanying idea that the individual so trained is somehow endowed with knowledge enabling him to do wisely everything else related to the use of forest resources. The result has been lack of sympathetic understanding, for example, of conservation of forest wildlife as a resource to be maintained by modifying forest practices, and of the recreational development and use of forest areas. Errors have been made in management because in the earlier days of education in forestry scant attention was given to multiple use of forests, and modified programs of study had not been developed to supplement silvicultural and managerial aspects of forestry or to provide special training more detailed in character.

Modifications of programs of study resulting in rather specific concentrations have been made by those schools that foresaw the need of undergraduate training to meet present and future demands on graduates of forestry schools. Some institutions were particularly well fitted to do this. The industrial concerns using wood as a raw material need trained men. The nature of the program of study is evident if one scans the programs of study that have been developed. Likewise, even before the great rise of public recreational use of forests, the need for men specially trained in this use was anticipated. With the basis of the first two years of a general forestry course and the inclusion of some courses in silviculture and in wildlife management, such a program of study produces men who can serve in National and State Forests as well as Parks, and who have likewise an appreciation of the handling of the forest as a timber resource.

The criterion for any four-year undergraduate program of study is, first, that it be well rounded, so that the student's training may not give him only fundamental principles and the technique of his profession, but may be such a mental discipline as will enable him to solve the problems arising in professional work when he actively enters the field after graduation.

It is a fact that general professional forestry training in this country is being accomplished by means of a four-year undergraduate program; similarly, training in the several lines of engineering is given by a four-year undergraduate course. There is little likelihood that training either in forestry or in engineering will in the near future be placed on the plane of a professional school at the graduate level preceded by four years of undergraduate work basic to professional training, as is the case with medicine and law. Practical reasons outweigh theoretical.

There is no question of the desirability of advanced work following undergraduate training. At various schools of forestry an opportunity is afforded for graduate work and special research based on undergraduate training in forestry. This plan has been effective in enabling students of high ability to be trained by means of advanced courses and by individual projects of research, and to enter specialized fields requiring scientific training of its workers. Such specialized graduate training, however, is not needed for men in every position, nor in every phase of forestry work.

If one considers the positions into which graduates go, the nature of their work in national, state, and private forestry, and the remuneration therefor, it becomes clear that a seven- or eight-year period of training, such as is deemed necessary in law and medicine, is not desirable for everyone in forestry and its allied lines. Analyses of positions in forestry would be a distinct contribution to knowledge related to edu-

cational procedure.

From an educational standpoint, one should consider the nature of professional courses in relation to the period when they are taken, and their educational value. Forestry courses, like engineering courses, are of a character and quality that an undergraduate may intelligently take, and from this training receive an adequate mental discipline as well as acquire the technical foundation for professional work.

Our attention needs first to be given to our present undergraduate programs. Perhaps the greatest criticism of these undergraduate schedules of study is that the curriculum is too heavy, too rigid, and also lacking in some courses that prepare for citizenship. The ambitious desire to lay a very thorough technical foundation has been the cause of this condition. Expanding demands and expanding knowledge have also tended to increase the extent and content of the various courses. Within the individual courses there has been an adding at the top, and but little subtracting in the process of education in a given subject. There is a need, therefore, to get rid of obsolete facts and concepts and to stress the principles that govern today's needs. Curricula should be reviewed to determine whether courses may be eliminated or consolidated, to free the student's time to pursue other courses that may better round out his training in the undergraduate years. A good example of what is meant is found in the preforestry course of freshman mathematics, the so-called unified mathematics which enables the instructor to give the essential algebra, trigonometry, and analytics as well as the fundamental conceptions of calculus.

Similar thoughtful consideration should be given to the technical forestry courses. The trend has been to split up a field into many highly specialized unit courses which fail to be properly integrated by the students and by the instructors in the several courses.

There is need for improvement likewise in efficiency of teaching, not only to squeeze out the water but to make use of efficient techniques of education. After these things have been accomplished, it will be possible much more intelligently to determine whether a four-year undergraduate program meets the need, or whether a fifth year must be added.

It is likewise absolutely essential to consider the ultimate service to be rendered, for otherwise the course of training that is designed may fail to provide men who can meet professional problems competently. Freedom in determining the ways and means of training as well as the nature of curricula must be assured to those who are engaged in educational work.

As was pointed out in last year's report, our major interests in forestry education are: (1) land management, which may include other active uses of land beyond that of growing timber; (2) the growing of timber, including all that bears on that problem; (3) the conversion of forest products. Growing of timber may be included correctly under land management, but is separated here because of its major significance. In all of these, the viewpoint of the forester is not lost; and that is perhaps the most essential thing.

The Chairman, in preparing this report, has avoided purposely the discussion of the training given in schools and colleges of forestry in relation to admission to the Society of American Foresters. The schools are training men for professional life-work, and not primarily for admission to any professional society.

The Society of American Foresters has the full right to determine what constitutes eligibility for its membership, and to point out what training is deemed adequate or inadequate for acceptance of members; but the freedom of educational processes and progress should not be hampered by a system of metes and bounds.

R. C. Bryant.
Ovid Butler.
D. S. Jeffers.
W. Kynoch,
S. N. Spring, *Chairman.*

FINAL REPORT OF THE COMMITTEE ON TEACHING OF PREFORESTRY SUBJECTS

At the last meeting of the Division of Education, the Committee on Teaching Preforestry Subjects submitted a progress report and committed itself to prepare a final report for the consideration of the Division at the 1937 meeting.

During the year, the Committee asked the head of each forest school for his opinion concerning desirable changes in the methods of instruction in basic subjects underlying forestry. Replies were received from most of the forest school heads. Naturally these replies differed with respect to certain details, but there was substantial agreement in the point of view that even a more comprehensive study than the Committee could possibly make of teaching preforestry subjects would contribute little toward effecting changes at any given forest school.

It also appears clear that the responsibility of providing good instruction in preforestry subjects falls squarely upon the departments teaching them. If these subjects are not well taught at a given institution, the department of forestry may properly protest, or perhaps, better still, effect certain changes gradually through informal interchanges of ideas.

The Committee urges that every forest school continually study the educational problems with which it is confronted, that there be a free interchange of ideas concerning instructional problems between the different forest schools, and that every instructor in forestry subjects attempt to apply the same critique to his teaching methods as he applies to his researches, to the end that teaching methods in forestry may constantly improve.

The Committee on Teaching Preforestry Subjects submits this as its final report and requests that the Committee be discontinued.

Shirley W. Allen,
Joseph Kittredge,
H. P. Brown,
Carl Woodward,
C. H. Guise,
Henry Schmitz, *Chairman.*

DISCUSSION

The general discussion was opened by Mr. Mulford, with the following statement:

"It will be a disappointment to me if the plan tentatively suggested in President Chapman's report is adopted. In my judgment, the curricula of our forest schools do not provide as thorough a discipline as that given by colleges of engineering and by curricula leading to several other professions. It would seem that two of the reasons are our own shortcomings as teachers, and the narrow outlook of graduates. A reduction in the number of units of required forestry, with a corresponding increase in the time spent in supporting departments, should advance education in forestry.

"Such a change would compel better teaching. Silviculture can be taught in one half-year instead of one year. Ably done, it will meet the needs of the general practitioner. An additional half-year or more of silviculture should be offered to men going on with graduate work, or to students desiring some degree of specialization as undergraduates. This advanced work could well be mostly of the seminar or discussion type. To give silviculture as a half-year requires that the student have an effective foundation in plant physiology and ecology. More especially, it requires strong teaching by the professor of silviculture.

"The same policy is possible with dendrology, mensuration, and management. Such simplification of the instruction in

forestry would mean elimination of much of the merely factual teaching which can be found in publications when needed. Why should we teach the details of eastern dendrology in western schools, and *vice versa*? Or the detailed silvicultural practices of every forest region? Why teach handicraft and woodsmanship at all? College years are too precious for these things.

"A change of this kind would mean teaching of principles; of methods of tackling a problem; of viewpoints and backgrounds; of clear thinking and clear expression. It would compel the best teaching, or retirement of the instructor unequal to his task. It should also help to avoid narrowness of outlook on the part of graduates. The time saved would make room for more work in the biological sciences; in chemistry, physics, or mathematics; or in economics, political science, philosophy or psychology; perhaps in foreign languages or in our own sadly neglected tongue. Naturally, the student could not work in all these fields, but a wise choice could be made to meet individual needs.

"Bringing the student into more fields of thought should result in a greater sum total of mental power, regardless of the relative effectiveness of teaching in the supporting departments and in forestry itself. Particularly should this result from chemistry, physics, mathematics, or logic, if wisely taught. Greater breadth of curriculum will mean that the student mind encounters the minds of more teachers. He should thus learn a greater range of methods of approach, gradually arriving at a clearer realization of relationships and of new possibilities. Rich avenues of enjoyment will have opened up for his own fullness of living, and at the same time there will be greater likelihood that he will discover forestry for what it really is.

"And what is forestry? Probably the broadest of all professions in the number of points at which it touches with intimacy the other affairs of man.

"It is true that thus far the American forester has not been sufficiently a man of the woods. But this is not in conflict with another fact, namely, that the American forester must become much more than a man of the woods. Otherwise, leadership in his profession may pass to men trained in other fields.

"Certainly the student should begin to know the forest while still in college, through a reasonable amount of instruction while actually in the woods. But for the most part he must learn to understand the forest as he lives with it later on. College years are the golden years in which to open his mind.

"To sum it up: let's try fewer units in the department of forestry; with more units, chosen with fine discrimination, in several other departments of human thought, which are in reality parts of forestry itself. Rather than sacrifice this principle, I personally would prefer to have our boys temporarily debarred, if necessary, from the much-to-be-desired membership in the Society of American Foresters."

John D. Coffman stated that he believed the education of foresters should be strengthened in two fields, namely: forest esthetics or landscape planning, and wildlife administration.

H. S. Graves called attention to the problem of the possible overloading of curricula with an advance of knowledge of forestry, and of the necessity of teachers keeping abreast or ahead of developments in their special fields. Reorganization and review of courses in the light of new knowledge may result in simplification of such courses and in a reduction in their actual number, thus permitting some latitude for the inclusion of other material in forestry curricula.

D. S. Jeffers expressed the opinion that it may be quite impossible for the forest schools to meet all the requirements put on them as a result of Civil Service requirements, the ever-expanding field of

forestry knowledge, and now the Society of American Foresters.

Myron Kreuger called attention to the fact that the discussion of Mr. Chapman's proposal involved two considerations: (1) forest education as it affects admission to the Society, and (2) forest education as it affects training for the profession of forestry. Mr. Kreuger stated that he believed graduation from an accredited forestry school should qualify a graduate for membership in the Society, and that the question of competence as a professional forester might be obtained by a system of licensing, as practiced by other professions such as engineering, law, and medicine.

Paul M. Dunn expressed the belief that the forestry faculty of Utah Agricultural College would approve Mr. Chapman's proposal to set up minimum requirements in forestry instruction for Junior membership in the Society, even though it might require increasing the length of time necessary to complete the forestry course to more than the standard four years.

After considerable more discussion of the subject, Mr. Chapman stated that before the Council took final action on the proposal to set up minimum instruction in forestry as a standard for admission of Junior members of the Society, the Division of Education should thoroughly canvass the attitude of the forest school faculties and report to the Council. Henry Schmitz, as Chairman of the Division of Education, was instructed to make this canvass.

The meeting then adjourned.

TUESDAY MORNING SESSION, DECEMBER 15, 1936

Subject: Society Affairs

THE Society met first in executive session. The report of the proceedings of that session is published in January S. A. F. Affairs. The rest of the Tuesday morning session was devoted to committee reports, with Thornton T. Munger in the chair.

Chairman Munger: The Society has a number of committees that have been at work during the past year who are ready to report at this conference. We heard one of the reports yesterday morning, on "The Forest Acquisition Policy". Last evening, at the educational session, a report was submitted for the consideration of that group. Tomorrow a report will be presented by Mr. Rachford from the Committee on Game Management. This morning there are three reports on the program.

In the Northern Rocky Mountain Section, a committee has been at work on a Report on "Recommendations to Improve Forest Exploitation Practices in the Inland Empire". Copies are before you. Mr. Anderson, of the Section of Forest Products in the Northern Rocky Mountain Experiment Station of the Forest Service, is Chairman of that Committee. I will ask him to give the high lights of the report.

Mr. I. V. Anderson: I do not wish to burden you with the entire report. It represents a rather cosmopolitan viewpoint; you will note the membership of the Committee includes foresters from every timber-holding and operating group in the Inland Empire—E. C. Rettig, Forester and Land Agent; M. Bradner of the Northern Rocky Mountain Forest Experiment Station; Roscoe Haines, Forester and Land Agent for the Anaconda Copper Mining Company; C. K. McHarg, Assistant Regional Forester; Lee Muck of the Indian Service; Rutledge Parker, State Forester of Montana; and John S. Barron, Forester for the Diamond Match Company. I will read a few excerpts.

Mr. Anderson then read from the report:

Introduction

Commercial exploitation of the forests of the Inland Empire[1] was initiated concurrently with other industrial enterprises of the region. In Montana the lumber industry went into large-scale production of principally ponderosa pine in 1886, to supply the demand of the Butte copper mines, while exploitation of this same species started simultaneously in other parts of the Inland Empire. In 1905, when eastern markets became available, production of western white pine started on a comparatively large scale. The greatest development in exploitation practices has taken place over the past 15 years, during which time the tractor and motor truck have been universally adopted in most of the region with the exception of the white pine type. Here, due to rough topography, most of the skidding is still done by horses, but motor trucks have entirely replaced the old sleigh haul and have made a substantial reduction in railroad hauls. Since the Inland Empire contains a wide diversity of forest types, topography, and climate, and since its forest industries require the raw

[1]Includes the forested area in Montana west of the Continental Divide, Idaho north of the Salmon River, and Spokane, Pend Oreille, and Stevens Counties of eastern Washington.

material in numerous forms, any recommendations for improvement of exploitation practices should be prefaced by a review of existing exploitation practices and a statement of important problems. For this reason the Committee is presenting its report in three sections, namely: (1) prevailing exploitation practices, (2) principal exploitation problems, and (3) recommendations for improvement of present exploitation practices. These three phases of the whole question are discussed for the western white pine, ponderosa pine, and larch-Douglas fir types, which constitute the three principal commercial timber types of the region. Presented in this manner, the recommendations for improved practices provide the background necessary for a complete picture of the entire regional exploitation situation. . . .

* * *

Recommendations for Improvement of Present Exploitation Practices

Possible improvements in current practices in the logging of Inland Empire timber are numerous in each of the commercial types. However, the extent of the specific betterments that can be effected are substantially limited by economic factors inherent in the individual operation. Four specific subjects which this Committee feels possess possibilities for improvement are: (1) methods of cutting, (2) chemical utilization research, (3) slash disposal, and (4) motor truck transportation of forest products.

Methods of Cutting

From the broad forest-management viewpoint there are two methods of cutting being practiced today. They are liquidation and sustained economic cutting. The precise technique to be used in both methods is still subject to some difference among foresters and lumbermen of the Region. This is particularly true of liquidation cutting, which by virtue of economic necessity prevails on most of the private logging operations. Consequently, the following recommendations are not based upon average prevailing practice but upon optimum practice as indicated by logging and milling studies.

Liquidation Cutting

This is a system of cutting in which only those trees contained on petty marginal and super-marginal *areas* which can be handled at a profit are logged with the objective of securing the greatest current gross profit per acre. It now prevails upon the bulk of privately owned operations but varies from clear cutting pine stands down to 11 or 12 inches to a true zero margin system. Those operators whose present balance between available stumpage, plant capacity, and plant investment does not make a permanent operation possible would do well to observe the following cutting principles outlined for each of the principal commercial forest types.

Western White Pine Type.—Leave all white pine trees 13 inches d.b.h. and smaller and occasional open-grown, coarse, dead-limbed trees above that size to 24 inches. Cut mixed timber down to and including 18 inches d.b.h. wherever the market permits. In 100-year-old white pine stands such a system frequently results in a residual stand of 6,500 feet of white pine per acre. Likewise, Table 5 indicates a residual stand of 1,030 feet of white pine and a total residual volume of 21,150 feet on a 150-year-old white pine logged-over area. Such a cutting system definitely provides a second cut when market conditions permit or in at least 50 years, and assures future forest-land productivity upon all but the climax stands of the white pine type.

Ponderosa Pine Type.—On areas operated for saw-logs leave all ponderosa pine trees and associate species 19 inches d.b.h. and smaller. Cut no associate species except when utilized for special products. While the diameter limit for ponderosa pine is arbitrarily set it should be, in actual practice, flexible in order to permit selection of high-quality trees below the diameter limit as well as exclusion of outstandingly low-quality and defective trees above the diameter limit.

Larch—Douglas Fir Type.—On areas operated for (1) saw-logs, leave trees of all species 14 inches d.b.h. and smaller, (2) sawed ties, leave fir and larch trees 12 inches d.b.h. and less, and trees of other species 14 inches and smaller.

Sustained Economic Cutting

The prescribed methods of cutting are temporary expedients required, because of inherent economic factors, during the transition from liquidation to sustained economic cutting, which should be the ultimate practice on all lands of the Region under permanent forest management. The latter form of cutting may broadly be defined as a continuous form of forest exploitation that meets all requirements of man's needs. Its ultimate adoption is urged on all lands, public and private, designated for sustained forest production. Forest industries should be grouped according to their general possibilities of sustained economic cutting. Then an analysis should be made of each operation having positive possibilities, by an impartial agency. The results of these analyses should show specifically the obstacles to sustained economic cutting plus definite and positive recommendations for overcoming them.

* * *

NEEDS OF LIQUIDATION AND SUSTAINED ECONOMIC CUTTING

Both liquidation and sustained economic cutting will be facilitated by:

1. Establishment through court action of the nonassessable or nontaxable value in submarginal trees left on cut-over lands.

2. Enactment of tax legislation in Idaho and Montana designed to fix and stabilize an equitable tax on petty and supermarginal trees left on cut-over lands designated as forest crop lands.

3. Stabilization by law of a clear-cut policy regarding the degree of public responsibility in defraying the cost of forest protection from fire, insects, and disease and for rehabilitation of salvage cutting areas on specific sustained cutting operations.

4. Application of tree grades to inventory of ponderosa pine stands and development of same for western white pine, larch, and Douglas fir (Inland Empire variety) to facilitate more orderly exploitation of these species and balance amount and character of timber cut with market requirement.

CHEMICAL UTILIZATION RESEARCH

Public and private owners of larch timber should finance a continuation of research efforts designed to facilitate commercial utilization of larch extractives.

SLASH DISPOSAL

Idaho.—The slash disposal section of the Idaho law is sufficient to meet all requirements, but as is usual in all enforcement, administration lags behind. This is principally due to the insufficient appropriated funds to support the agency charged with enforcement. At the present time, it is only possible to finance two slash disposal inspectors in addition to the fire wardens. At least three additional inspectors are needed whose function it should be to instruct in methods and practice. It too frequently happens

that well-piled slashing is fired before the ground is sufficiently wet to hold the fire within the areas of the individual pile. The result is a more or less extensive broadcast burn and consequent killing of varying proportions of the residual stand. Slash burning is a too highly technical job to turn over to inexperienced men without supervision.

Montana.—In Montana, the fifteen cents per thousand limitation is not sufficient, even recognizing that the general hazard is lower. A more reasonable figure would be twenty or twenty-five cents. While this increased limitation would not provide for a complete clean-up, it would result in a reasonable hazard reduction commensurate with the present protection cost.

Washington.—In Washington, there should be basic recognition of the difference between the timber types in the coast fir and the Inland Empire pine. Certainly, long experience has shown that piling and burning in the white pine, ponderosa pine, and larch—Douglas fir types is the approved method, varying the intensity of the work with the general fire hazard of the locality.

Cost of Satisfactory Slash Disposal

Cost varies greatly within each type, depending upon such factors as topography, presence of varying amounts of residual stand, and young growth. Average costs are: white pine type, 50 to 75 cents; ponderosa pine type, 25 to 40 cents; larch-fir type, 40 cents.

MOTOR TRUCK TRANSPORTATION OF FOREST PRODUCTS

Improvements in motor truck logging roads, methods, and equipment offer one of the most direct means of reducing production costs of forest products, thereby increasing the margin available for defraying the expense of optimum forest practice. Therefore, it is suggested that interested operators and public-stumpage-owning agencies of the Inland Empire finance a motor truck transport research bureau for the purpose of (1) conducting current investigations on all activities (including equipment) directly related to motor truck transportation of forest products and (2) dissemination of results of such investigations at regular intervals to interested concerns.

DISCUSSION

Mr. Martin: I have gone over this report in its preliminary form. While perhaps differing in a very few details with the recommendations, I want to assure the Committee which prepared it that the forestry department of our Association will advocate reaching these minimum requirements as rapidly as possible.

I have one suggestion to make. The word "exploitation" gives the impression of going to the limit, taking every advantage. I don't think this report quite has that implication; and I believe if it were called "report on utilization" or some like term, that would be better.

Mr. R. W. Cox: I had the opportunity to review this report. While I differ somewhat from the Committee on a few points, particularly in regard to silvicultural practice, on the whole I feel that this is a fine piece of work and will prove very valuable to the foresters and operators in the region. I don't think it would be worth while at the present time to go into the few details regarding which I had some discussion with the men responsible for the report; on the whole I can very strongly endorse the recommendations.

Mr. H. E. Holman: For about a year

I was connected with the forest practices under Article X in the Inland Empire, and while I haven't had the opportunity to review this report yet, I had the privilege of working rather intimately with Mr. Anderson and some of the others. I feel that as a rule the operator in eastern Washington is ready to accept any changes that can be put on a practical basis, to fit the individual operation. In the first stages of enforcing Article X there was no difficulty whatever in getting a fine spirit of cooperation. I know from past experience that the boys from Region One have the most valuable asset that one could possibly have in a program of this kind. They have the complete confidence of the operator. That is the first step in putting over any kind of program. I believe the operators are 100 per cent ready to accept a program that can be put on a practical basis. But in a program of this kind there should be adequate personnel to make an intimate study of each operation, not a blanket recommendation for all operations. The operator must in the final analysis adopt a policy that will fit his own limitations. There must be personnel enough to make individual surveys, so that the proper application will not disturb or exploit the confidence that has already been created.

Dean Jeffers: The matter of definitions bothers many of the younger foresters. You apply the word "sustained" to economic conditions or yield; and the younger foresters are in the fog. Sustained production as generally accepted applies to cubic content or cubic volume. Probably acceptance is not quite so general if it is applied to board-foot content. A man sitting close by me just suggested that sustained production might raise a serious difference when you bring in quality or grades. Then comes another meaning, when you make sustained financial income the standard. A step farther is the thing that most bothers the younger forester: production to sustain the political and social and economic institutions that go along with the production of timber and land management. In the problems of any profession, it is nearly always necessary to lop off many things which were previously thought essential. Progress means some things must be left behind. The young forester is saying, "What are you leaving behind?"

Chairman Munger: Mr. Jewett, would you like to comment on these forest practices?

Mr. Jewett: I don't think so. I appreciate very much Mr. Holman's statement. I think we have an unusual degree of confidence in one another here in Idaho and the Inland Empire.

Chairman Munger: We will now receive the report of the Forest Protection Committee, of which C. S. Cowan is Chairman. Mr. Cowan is Manager of the Western Forest Fire Association.

Mr. Cowan: Our Committee consists of E. I. Kotok, Director of the California Forest Experiment Station; Grover Conzet, State Forester of Minnesota; Harry Lee Baker, State Forester of Florida; J. W. Ferguson of the Oregon Forest Service; E. H. MacDaniels of the U. S. Forest Service, Region 6; and Fred Morrell, Assistant Chief of the U. S. Forest Service. This report has been submitted to all of them, but it has not been signed by all. A rough draft went out to all the members; and various changes were suggested. Mr. Conzet could not quite reconcile himself to the figures as presented because it placed a halo on the heads of the lumber fraternity, and he couldn't quite see that. So we dimmed the halo a little and he was satisfied, but he has not yet signed the report. Mr. Morrell had four objections, but they were mainly in language. I sent him the re-

constructed report by air mail and asked him to wire me if he still had objections. I have had no answer, so I presume the report now meets with his approval. Also, I have had no answer from Mr. Baker.

Mr. Cowan then read the following report.

REPORT OF FOREST PROTECTION COMMITTEE

IN order to present a report which is more than local in its application, a study has been made of several states. These include Minnesota, California, Oregon, and Washington. Originally Florida and Idaho were also included, but the problem of properly weighting the protected and nonprotected lands involved factors which so complicated what should be a simple report that it was thought best to delete Florida from the figures. Idaho presented a picture which included a tremendous lightning fire hazard, and this also prevented proper weighting of the preventable risks. Idaho was therefore taken out of the picture.

This report was set up in order to show trends in preventable fire causes and the acreage burned from such causes. It covers the period 1926-1935. It takes into consideration those years which showed the period of the greatest timber extraction of all time, as well as the slack years of 1931, 1932, and 1933.

It should serve as a guide to our future activities regarding forest regeneration as well as forest preservation. The graphs depict, for all who might see, the principal reasons for fire occurrence. Side by side with cause is shown effect, in that the acreage covered by these fire causes, as outlined, is also depicted.

Dealing with fire causes, we have only shown four broad classes. These are, first, logging operations; second, incendiaries; third, land clearing; and fourth, recreationists.

From a very superficial examination, it becomes obvious that foresters have made good on the job, so far as concerns those who have a *direct* interest in preventing forest fires, i.e., the timber operators.

Into the recreation class we have lumped all those causes which come from people who use the woods or forest areas for their personal pleasure. This class therefore includes smokers, hunters, berry pickers, picnickers, campers, and fishermen.

Under the heading of land clearing, there is taken into account only those fires set to clear land within the laws of the states in which such fires occurred.

Under incendiary fires are those which are set illegally; fires started on forest lands for spite, to create work, to make "bee pasture", and to create grazing areas.

The lumbering cause is self-explanatory. Starting in the year 1926, lumbering caused 430 fires in the territory included in this report. It should be noted that three of these states are heavy lumber producers, and therefore show a heavier proportionate weight in this column than would be shown if all states were included. The curve of occurrence shows a progressively decreasing total of fires chargeable to this cause. It shows most conclusively there has been a decided and progressive improvement. It is worthy of note that during the years 1926 to 1931 each of the other main causes of fire show an increase, while lumbering showed a decrease. Obviously there was a reason for this constant decrease, and it can be rightfully stated that the logging fraternity awoke, or were awak-

ened, to their problem, investigated the reasons for these fires, and having found them, took effective control steps.

While the graphs prepared deal with cause and effect (in this case acreage) on different charts, yet cause and effect should be closely linked in any report of this kind.

In 1926, loggers burned over 120,000 acres, and with various small peaks and valleys this acreage decreased until 1935 showed a loss of some 10,000 acres. In the same decade recreationists started the curve with 1,820 fires, reached a peak of 2,480 fires, and ended the year 1935 with 1,800 fires. The corresponding annual acreage loss from this cause is 520,000 acres, reaching a peak of 700,000 acres, and ending the curve with 52,000 acres burned over. The incendiary caused a peak of 780,000 acres, and the land clearer a peak of 412,000 acres.

Obviously, the purpose of a report of this kind is to analyze fire occurrence and to point out possible remedies.

Let it be said at the outset that the control of lumbering fires should be the easiest of matters. Lumbermen are confined to the sphere of their operations, and enforcement of state fire-prevention laws should be a matter of inspection and rigid supervision. The willingness of enlightened lumbermen to do everything within their power to prevent fires is dictated by a very understandable desire to prevent expense and loss. It is well to point out, however, that the gush of unenlightened instruction, coming from an uninstructed sentimentalism pointing to the mistaken idea that the lumbermen are almost solely responsible for forest destruction, has had its effect upon the public mind, and the public press. Articles have been published which lead to the conclusion that the lumbermen are responsible for all devastated forest areas. Harvesting a forest crop is not necessarily devastation, but public misuse of forest land most certainly does lead to soil erosion, destruction of forest growth, and all the ills which make up the conditions broadly termed devastation. It is time the true facts were presented. This is none too popular a move; apparently as a people we desire to hide our faults, rather than face them. Let it be known that the greatest danger to continuing forest production comes from public misuse of forest lands. This is so true as to become a definite duty on the part of those who do, or should, know the true facts.

It also becomes increasingly obvious that the greatest danger to reforesting land comes from recreation seekers and incendiaries.

These two classes are, of course, the most difficult of control. The recreationist too often chafes bitterly, and most vociferously, at any restriction upon what he believes are his personal rights. Who is there to control him? In the state of Washington we have of late years secured a very large measure of cooperation from the Game Commission and the various sportsmen's associations. This has led to a marked decrease in fires caused by hunters and fishermen, at least from those sportsmen who hunt and fish within the legal restrictions set up. The poacher, who is unfortunately bracketed with the true sportsman, is already the objective of the game protectors of most states. It is the poacher who is, in the main, responsible for the majority of forest fires from this cause. It requires the efforts of all citizens to bring these poaching gentry within the fold, either the fold of true sportsmanship or the law. We have secured this measure of successful cooperation with the Game Departments because forest protection gives them direct and personal benefits. But berry pickers, campers, motorists, and picnick-

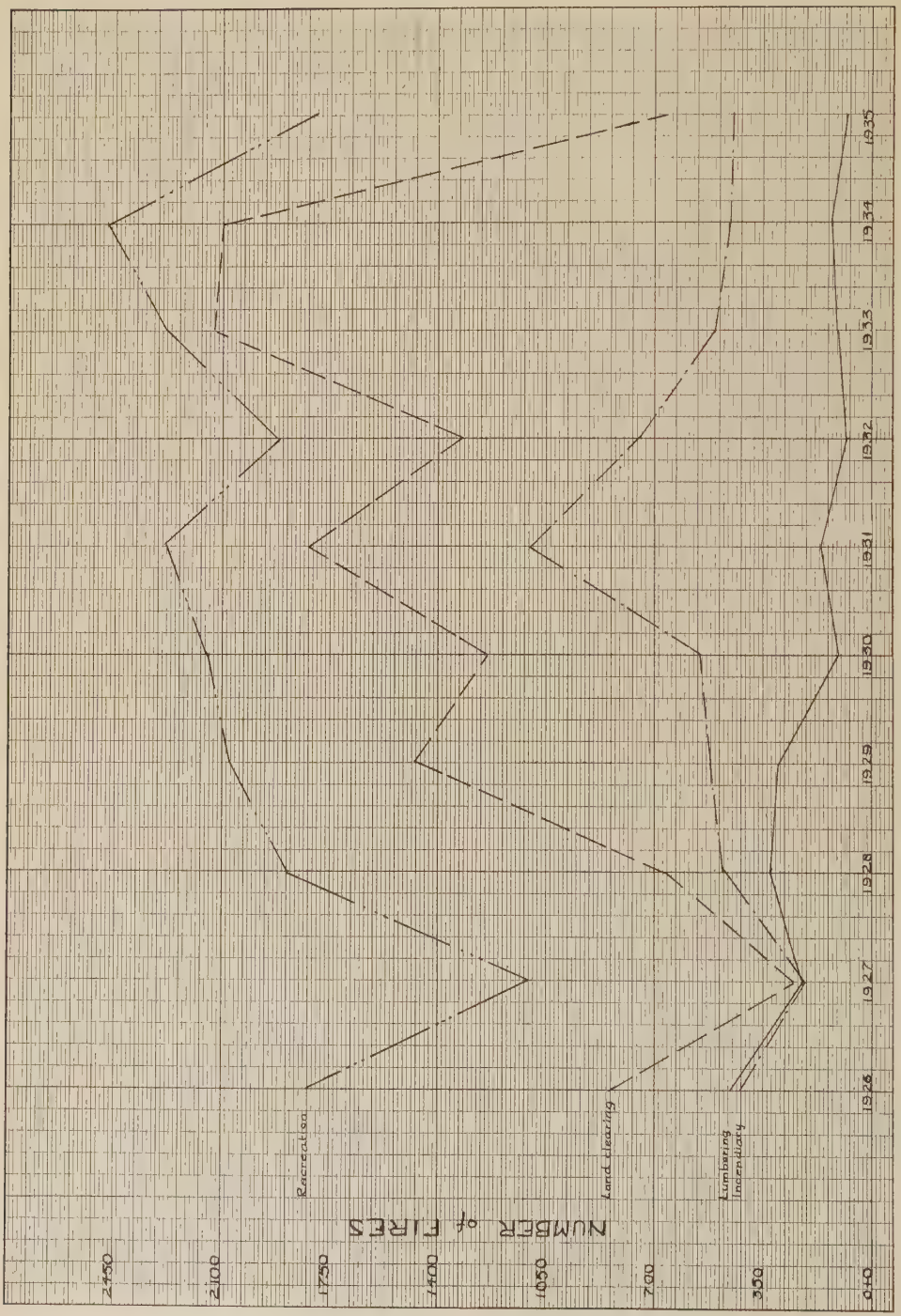


Fig. 1.—Comparative number of fires, 1926-1935, inclusive, from recreation, land clearing, lumbering, and incendiaries.

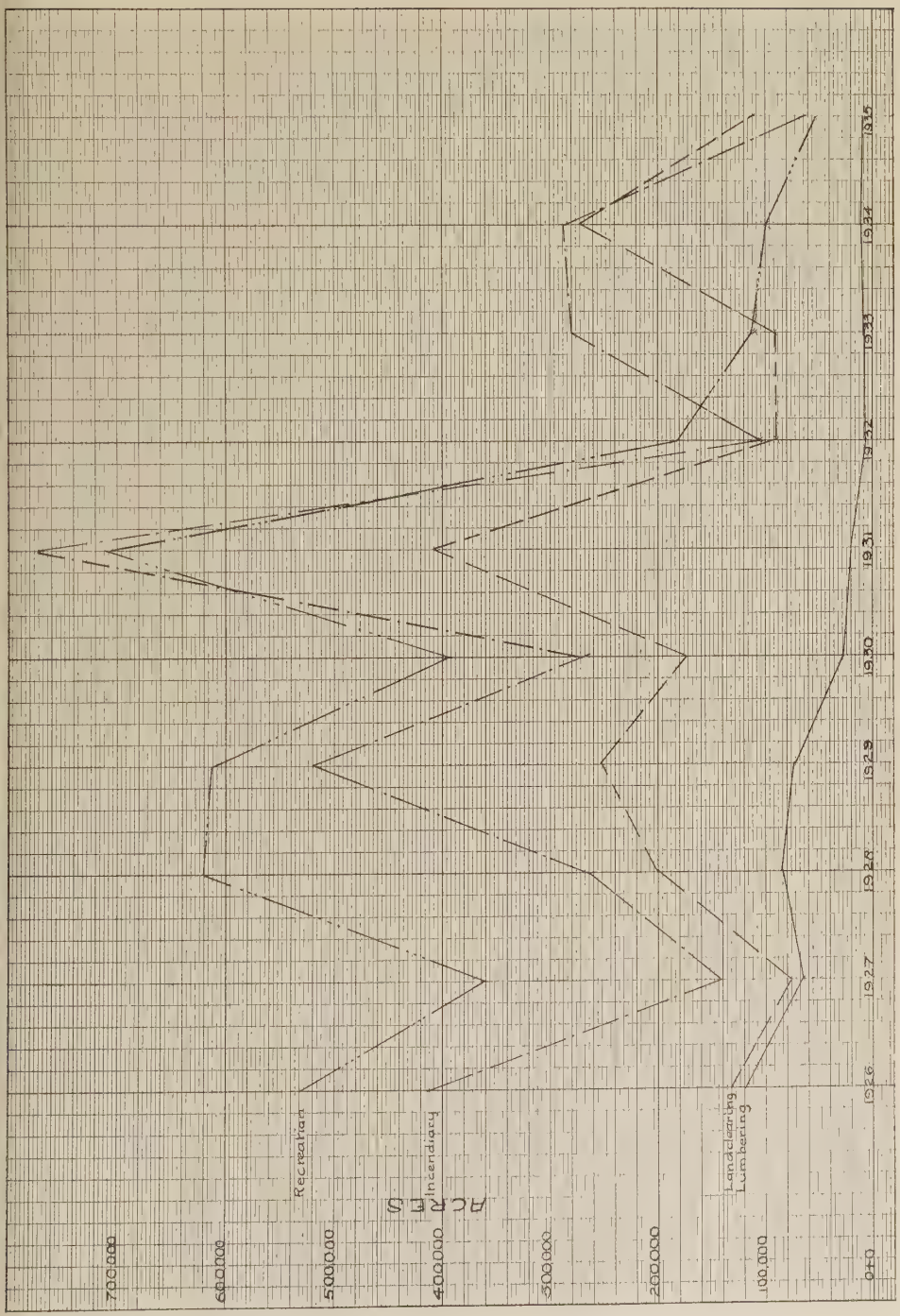


Fig. 2.—Comparative acreage burned over, 1926-1935, inclusive, from fires due to recreation, land clearing, lumbering, and incendiaries.

ers are harder to control, simply because there are more of them and they are unorganized. It requires an increase in the wardens and forest-officer ranks to adequately take care of this situation. If in just four states there is shown a one year's acreage loss of over 700,000 acres of what should be growing forest, from one cause, obviously there is a problem in which half-way measures are bound to fail. We must also remember that the acreage loss for the decade 1926-1935 from this cause is 3,682,440 acres for four states only. Against this we have the record of loss from lumbering fires of 471,000 acres for the same period. If to these totals we add the loss caused by land clearing of 3,108,971 acres, and a loss caused by incendiaries of 1,816,210 acres, it becomes most obvious that the problem has become, in the words of E. T. Allen, "not a fire hunt, but a man hunt".

To secure a full picture of the acreage loss for the decade 1926-1935 inclusive, let us realize that the partial acreage loss is chargeable as follows:

Cause	*Percentage*
Lumbering	5
Incendiary	20
Land clearing	35
Recreation	40

Keep in mind that we are dealing only with the main causes of fires, we have deleted lightning, railroads, and other causes for the purpose of this report.

In the cause column, it appears that recreation fires are increasing, even though the year 1935 shows that from this cause we had approximately the same number of fires as in 1926. Studying this cause further, we find that the year 1932 shows a remarkable decrease in acreage loss, from 700,000 acres in 1931 to 140,000 acres in 1932. Yet the causes show a decrease in the same years of only 400 fires, or from 2,300 to 1,900. In other words the fires decreased but 17 per cent, while the acreage loss decreased 80 per cent. The answer to this comes from a study of the weather records of the three coastal states. Simply, 1932 was a wet year. This tends to the belief that the decrease was not due to any greater care being exercised by the public, but simply means that nature took care of a great number of potential fires.

The decrease in fires set by land clearers as between 1934 and 1935 may be in part due to the fact that a measure of crop control was exercised by the A.A.A. and other economic influences. It also means, according to my information, that forest officers have succeeded in securing a greater measure of cooperation from the land clearer.

The peak of incendiary fires was reached in 1931, and the number shows a very marked decrease up to 1935. The acreage burned over by this cause in 1931 amounted to 780,000 acres; in 1935 it was 60,000 acres. The year 1932 was, as we have pointed out, a wet year; in 1933 the C.C.C. was established, and this organization, I believe, is the cause of the decrease of acreage loss from this class. It also leads to the belief that a greater measure of control exercised through the proper expenditure of public funds will return public benefits. It is obvious, however, that it is not good economics to spend several hundred millions of dollars annually, just to control the incendiary problem; there must be other methods, conducive of even greater benefits, which can be used.

Now, what of the suggested cure? Let us first approach the two greatest causes of acreage loss. If these losses were transcribed into actual money values, and occurred within urban centers, what a noise would be made! Are the values

destroyed any the less because the property loss happened to be forest-land values? In the case of urban property loss, state law-enforcement officers, city police, and state insurance officials would investigate the matter and bring the culprits to justice. A trained, organized force would swing into action at once. Public opinion would be aroused. Does not this suggest the necessity for similar action to control forest fire occurrence? The U. S. Forest Service and most states have legal departments trained in the prosecution of such cases. But such training can only be exercised *after* the culprit is apprehended. There lies the weakness. We need trained men, we need to apprehend the incendiary, and it can be done. It is a matter of securing trained investigators. Just appointing a man to a position of investigator will not do; we must go after the job with something like the force, energy, and intelligence we put into the work of creating fire-suppression equipment, of fire detection and actual fire suppression. We must make the incendiary realize that setting fire to forest land is a criminal procedure and will be followed by punishment.

As I write this, there has come to my desk a report, dated November 5, 1936, which states: "I have just talked to the warden in the White Salmon District. He states that between 20 and 25 fires have been set in Township 5, Range 10 East, last night. Most evidently set for stock and sheep-grazing purposes. These are forest lands, paying for patrol and protection. Unfortunately these fires are burning up the reproduction." This is a situation we face annually. It is necessary to make an issue of such cases. A start must be made to vigorously prosecute the fire bug. We have the facts in our possession, we know the results which follow illegal setting of fires on forest lands. We have publicized the part the logger has taken in burning; is it not time for us to publicize the part the general public is playing in forest devastation? The sane harvesting of a forest crop should not mean more than the harvesting of any agricultural crop. Yet the opening of a forest area has heretofore led to a measure of land devastation that forebodes ill for the future of forestry. We must arouse the public to the fact that its own wilfulness and carelessness is a menace to the Nation.

This is the story as it has been unfolded by the record. We have two options, and two only. The first is that we can go on spending time, energy, ingenuity, and vast sums of money to combat the fires as they severally occur, and the result will be merely the expenditure of time, energy, and money.

The second is to build such a field staff as not only will be able to fight fires, but will enforce the law regarding carelessness or criminal intent. It is reasonable to suppose that an increased force of field men would be more adequately prepared to undertake the job. State and federal governments both have a responsibility to the country in this matter. In addition to this, we must develop and train a field force which will investigate every incendiary fire and track down the fire bug. A violin in the hands of a Kreisler is one thing, and in the hands of a Nero is quite another.

Let us stop for a while in the development of new means of suppression, and let us develop positive and efficient means of preventing fires by a properly organized campaign to make the public conscious of its responsibility for forest fire causation, and to bring this home by a vigorous and well organized body whose duty it will be to apprehend those who are responsible for the tremendous annual drain upon the forest productivity of the Nation's forest lands.

We have an effective instrument in our hands, the Clarke-McNary Law. For

some reason we have never utilized its full power—in these days we are actually hesitant about the investment of a million dollars, with the future of forestry dependent upon it.

If the appropriations authorized under this act were really made, and gradually increased to the limits recommended by the Copeland Report, there would be results to point to, instead of acreage loss to talk about. Surely Clarke-McNary inspection would welcome this step. Certainly the Nation would profit by it.

We have gone far enough to know the enemy of continuing forest production; it now remains for us to beat him. If we do not progress, if ostrich-like we stick our heads in the sand and leave the least intelligent part of our anatomies protruding, then we, as foresters, will have failed in our duty to ourselves and the public we try to serve.

DISCUSSION

Mr. A. E. Wackerman: Last year I analyzed the data on fires in my state, and was astonished at what I found,—that 44 per cent of the fires on state and private protected areas were caused by incendiarism. Other causes were fishermen, hunters, etc., until down at the lower end of the list came railroads with 2.5 per cent, lumbermen with 1.7 per cent, and lightning with 0.6 per cent. Fully 95 per cent of the fires on protected areas were caused by the public's carelessness. The incendiarism was not necessarily malicious; the fires were set by people who thought it was the right thing to do, not because of any grievance.

Just before I came to the meeting I received statistics for the year 1935, and checked them through hurriedly. They were practically the same with the year previous. I think it is time that we, as foresters, make the public realize that it is actually the public who burn the woods.

Mr. Fred E. Ames: May I ask where on the chart the Tillamook burn appears?

Mr. Cowan: You won't find it. In this set-up that Tillamook burn was overlooked. The set-up was to get the area of greatest concentration of lumbering operations. That was taken as being western Washington. The Forest Service reports were taken from the Oregon National Forests. California and Minnesota supplied the figures for the total state; and that point was overlooked altogether until the graphs were completed. The idea was to get a general cross section. But even if that area were put in, it still would not add up to the total increase of acreage as compared with other causes.

Mr. E. H. MacDaniels: Perhaps a little explanation along that line would not be amiss, although I didn't prepare those particular figures. In the first place, it is not certain that all that fire was due to lumbering. Evidence was submitted, and there is at least a possibility, that only the northern part of that burn was due to lumbering; the southern part, which went west with such great success, was incendiary fire. The other reason is that these great lumps in the area make statistics very unwieldy, and I suppose the practice of insurance men in general is that way. It was called a conflagration, and it spread over considerable timber. That is, I believe, the practice in handling a situation of that kind, to make the statistics less unmanageable.

Mr. Newell L. Wright: It doesn't seem to me that all the picture is there. I'd like to know where those fires started.

Was it in the timber, or on logged-off land?

Mr. Cowan: I don't know where they started. I got the reports from the State Foresters. All I know is what I got from them. I might add, however, going back to Mr. Ames' question, that there were two conflagrations which came from other causes. One of 810,000 acres, which we deleted also, came from a land-clearing fire. We took that also as a conflagration risk, which if included raised the total without proving anything; besides, we were running short of paper, as you can see by the graph.

Mr. L. T. Webster: It is quite generally agreed that educating the public is the thing we should do. On the other hand, it seems the very easiest thing to let slip. Has Mr. Cowan any specific program for it? What is the proper way to go about it?

Mr. Cowan: I outlined what in my opinion should be done. I believe that a campaign should be made whereby people become convinced that setting a fire, whether deliberately or through carelessness, is a punishable offense. I believe that a campaign, with wide publicity, to arrest and convict would be the finest way of spreading the gospel that we are losing our heritage of forest-land and reproduction values through the carelessness of the general public. That would mean a great many men added to the staff. It would mean a trained force of investigators, as I have already pointed out. Part of it would mean having people with fast pens writing in national magazines about what is happening. Fortunately I am talking here, on behalf of my Committee, to a group of men who are interested and sympathetic. The idea is not generally endorsed, through the Nation. The forest devastator has been pointed out in a lurid light. Largely those writers have only used the facts which they thought would make a favorable sales impression. I emphasize that point, sales impression. If we can get somebody who will present our side of the case, present only the truth, because we don't ask for any more to be presented than the truth, I believe he can go a long way in stopping this annual fire cause.

Mr. A. G. T. Moore: I was very much interested in those statistics. Wouldn't it be possible for the various state and federal agencies to keep a record for next year's meeting, to enable Mr. Cowan to show the number of convictions, years of sentence, and amount of fines paid? It strikes me that a chart of the years of time to be served and the number of dollars paid would be a fine piece of publicity.

Mr. T. S. Goodyear: Along with that need of educating the public is the need of educating our various prosecuting attorneys. We get evidence, we take it to our local prosecuting attorneys, and they apparently don't take the prosecuting or trying to get convictions very seriously. For example, I found a farmer had started a fire to burn up a cow that had been killed in the road. The fire spread up the mountain, and we had to get a lot of expensive fire apparatus to handle it. I went to the farmer and asked for his permit. He had none. That was one count against him. The second count was setting a fire dangerously near timber. I turned the case over to the prosecuting attorney. Later I went to find out how big a fine or how many days in jail the farmer got. The attorney said: "I went to prosecute the case, and I found two conflicting laws. Here is a law that requires a farmer to dispose of the dead carcass of an animal within so many days, by burning or burial; another law won't let you start a fire without a permit. So I dismissed the case."

Shortly after that we got a man we had

been after for five years for setting fires promiscuously. We finally caught him in the act. The next day, to my amazement, I learned the prosecuting attorney had hired another very prominent lawyer who put in a plea of insanity for this man. He was turned loose, and for the last two years has been at the same thing.

I think education should start first with the prosecuting attorneys. If they will take our forestry laws a little more seriously and attempt to get prosecutions and convictions when we submit evidence, we can add much to the chart that Mr. Moore suggested.

Chairman Munger: It is close to the noon hour, so the report by Mr. Kittredge on "Forest Influences and Erosion Control", scheduled for presentation this morning, will be held until a later session.

The meeting then adjourned.

TUESDAY AFTERNOON SESSION, DECEMBER 15, 1936

SUBJECT: FUTURE DEMANDS ON PACIFIC SLOPE FORESTS

Chairman: Hugo Winkenwerder

Chairman Winkenwerder: The topic for this afternoon is "Future Demands on Pacific Slope Forests." Some years ago Dr. Schenck, the German forester who conducted the Biltmore Forest School, said at the Pacific Logging Congress that forestry is 90 per cent utilization, because, as he put it, if we do not have a demand for the crops we can raise, what is the use of raising the crops? Our first topic this afternoon is "What the Pacific Slope Forests Have Now and are Now Growing in Relation to National Supplies and Demands." For a good many years we were guessing at this; but in 1930 an appropriation was made for a forest inventory. Mr. Andrews, who will present the first paper, has had a staff working on this inventory, and we now have some very definite information, which I think you will all agree is basic to solving our land-use problems.

Mr. Andrews then read the following paper.

WHAT THE PACIFIC SLOPE FORESTS NOW HAVE AND ARE NOW GROWING IN RELATION TO NATIONAL SUPPLIES AND DEMANDS

BY H. J. ANDREWS

Pacific Northwest Experiment Station

TO KEEP the record straight, the term "Pacific Slope forests" as used in this paper includes those in Oregon, Washington, and California. Since at best the supply of hardwoods in the Pacific Coast states is small and all hardwood logs cut in these states are manufactured into products which for the large part are consumed locally, coniferous timber only will be dealt with in this discussion.

Of the three Pacific Slope states, Oregon and Washington are chiefly dependent on outside markets for the disposal of their timber products, whereas California is not. I doubt if in the future California is going to play any great part in supplying the rest of the United States with timber products, largely because she needs these products at home. If California supplies fruit, movies, etc., to the rest of the country, it may be far more important that she plan to supply home industries and the people dependent on them with what they need in the way of forest products for the distant future, rather than export any large quantities of lumber in the immediate future.

For the past 10 or 12 years the situation in California has been about as follows:

Total consumption of lumber has greatly exceeded total production. California has been, and still is, importing lumber at a greater rate than it exports lumber. Since 1921 the high point in consumption of lumber was in 1923, when 4.4 billion feet were used. Consumption steadily dropped to about 1.4 billion feet in 1932, with only a slight increase since that date. In 1923 California produced about 2.1 billion feet of lumber, less than 50 per

cent of what it consumed. Since then production has steadily come closer to consumption, till in 1934 production of 1 billion feet was about 70 per cent of consumption. In 1932 slightly over one-half the lumber used in California (some 740 million board feet) came from Oregon and Washington, while in the same year some 680 million feet were produced in the state. For the past 14 years California has averaged an annual export of lumber to the rest of the United States of slightly over 400 million feet.

Therefore, although California will undoubtedly continue for the next few years to export some of its specialty woods, such as sugar pine and redwood, in the last analysis it is an importer of forest products and will play no large part in supplying the rest of the country with lumber, veneer, or wood pulp.

On the other hand, during the decade 1925-1934 Oregon and Washington consumed from 20 to 30 per cent of the lumber they produced, and much smaller percentages of their plywood and pulp production, leaving large amounts for export either to the rest of the United States or to Asiatic countries. In fact, the growth in the Douglas fir region of Oregon and Washington alone is more than the annual consumption of lumber in the two states.

At this time, only four years after the 1932 low point in lumber production, it is entirely probable that in viewing our future national demands for forest products we are still too far in the valley to have any good idea of the probable upswing still ahead of us. It must be remembered that the 1932 low of 10.1 billion feet of lumber produced in the United States has no parallel in recent years, and we have to go back to 1864 (the end of the Civil War period) before we can find another point as low, and even the increased cut of 17.5 billion feet in 1935 is about the same as the cut in 1879. Hallauer, as a result of his work on the Forest Survey requirements study, is of the opinion that we are on the upswing of a cycle the top of which should be about 1941 or 1942, the cycle to run to about 1950. He thinks consumption may reach a top equal to 1929 (about 37 billion feet), but suggests an average around 25 billion feet. Since 1930 softwoods have accounted for about 83 per cent of the total lumber production in the country, and in the 1932-1934 period the cut from Pacific Slope forests was about 51 per cent of the national cut of softwoods. If these ratios persist, it would mean that the Pacific Slope forests would supply about 10.5 billion of the 25-billion national total, which is slightly less than the average in the 1920-1930 period. So much for lumber requirements. Let us next consider plywood and veneer.

The demand and uses for coniferous plywood as distinguished from veneer is relatively recent. The number of uses to which this product is being put is amazing. In some instances plywood is displacing lumber to a certain extent, while in others it is not so much displacing lumber as it is being used in places where lumber was dropping out of the picture and giving way to other materials. The Douglas fir plywood industry has expanded from a production of 153 million square feet (3/8-inch 3-ply basis) in 1925 to an estimated 700 million in 1936, and these figures do not include the veneer cut for package and other single-ply uses. It is predicted that 20,000 auto-trailer houses will be built in 1937, and this use alone should require several million square feet of plywood. Incidentally, the increased use of trailers resulting in an increased use of plywood may have considerable effect on the lumbermen's chance to sell boards for summer cottages and other low-priced houses.

It is difficult to estimate the future demand for a product the production and

use of which has increased so rapidly in the past few years, but undoubtedly for a while at least the demand will increase, possibly resulting in an annual production of 1 billion square feet.

National requirements for pulp and paper have been and will be greatly affected by imports of both pulp and paper. In 1933 the total United States pulpwood requirements equaled 12.3 million cords, with actual domestic pulpwood consumption of 5.8 million cords, of which 1.3 million cords were consumed in the Pacific Northwest. The pulp and paper industry has grown very rapidly in the Pacific Northwest in the last few years. In 1925 it used 400,000 cords of wood. In 1935, ten years later, it used 1.9 million cords of wood, an increase of about 400 per cent, and produced 1 million tons of pulp. The 1.9 million cords of wood used in 1935 includes wood in the form of logs, forest cordwood, pulp chips, and mill waste, over 75 per cent of which was western hemlock, the remainder being Sitka spruce, white fir, Douglas fir, and black cottonwood.

The Hale Report states that possible future pulpwood requirements have been estimated at 25 million cords annually, and has assigned the Pacific Coast some 7 million cords. At this time wood-pulp production in the three West Coast states is practically limited to that part of Oregon and Washington west of the summit of the Cascade Range, the so-called Douglas fir region. There is only one mill in eastern Oregon and Washington, and none in California.

To sum up the situation, the present-day demands of the country, including requirements within the three western states, are resulting in an annual production in these three states of from 6½ to 7 billion feet of lumber, around 700 million square feet of plywood, and 1.9 million cords of pulpwood. Future national requirements may call on this region for from 10 to 11 billion feet (lumber tally) of lumber, 700 to 1,000 million square feet of plywood, and possibly 7 million cords of pulpwood.

So much for a brief picture of possible requirements. What about supplies?

The Copeland Report, based on the best data available in 1932, gives the stand of saw-timber in the United States as 1,668 billion board feet, lumber tally, with 1,041 billion, or 62 per cent, credited to the Pacific Coast. When softwoods only are considered, the Pacific Slope forests comprise about 70 per cent of the national total. Current results of the Forest Survey indicate that the figures are conservative, but the ratio between regions will probably not be changed very greatly.

Of particular significance is the fact that over one-third of the saw-timber in the three Pacific States is in trees over 40 inches d.b.h., and this represents over 80 per cent of the 40-inch and better d.b.h. coniferous timber in the United States. The high-quality products indicated by these large sizes, the great variety of species, and the large amounts of timber tributary to tidewater are favorable factors, overbalancing the somewhat unfavorable factor of geographic isolation which constantly confronts this territory in supplying its products to the large centers of consumption in the United States.

High-quality lumber shipped to the Midwest by rail and boat and the East Coast by boat has been and still is bridging the gap between the exhaustion of virgin stands in the East and South and the time when these regions will have more quality timber, since they now seem to be able to supply considerable amounts of the lower grades of lumber. Had there been in the past, or should there be in the future, a shortage of the better grades

of lumber, it might well mean that the lumber and other wood-using industries could easily lose certain markets to competitive materials, which markets, once lost, might never be recovered. Therefore in many ways the lumber industry in the West is not competing with the lumber industry in other parts of the country, but might well be considered as holding a market for a certain intervening period. Lower grades of lumber from the Pacific Coast cannot be shipped great distances by rail, and only compete with the lower-grade products of other regions in certain eastern seaboard markets.

With over 230 billion board feet of timber in the form of trees over 40 inches d.b.h., it is evident that Oregon and Washington can take care of high-quality lumber needs of the country for some time to come. Fortunately a very considerable part of the larger-size trees are within a reasonable distance of tidewater points, which makes the products of these large trees available to any ocean port in the country at reasonable transportation costs, usually $14 per thousand or less. Completion of Bonneville Dam, with its locks for ocean-going ships, will make The Dalles, Oreg., 180 miles from the Pacific Ocean, a seaport, and for the first time the ponderosa pine forests of a part of eastern Oregon and Washington will be within range of ocean shipment.

To date, the bulk of Pacific Coast plywood has been manufactured in the Douglas fir region of Oregon and Washington because of an ample supply of large high-grade logs (so-called peeler logs) produced in the course of logging for sawmills, and available principally from the open log markets of Puget Sound and the Columbia River. The plywood industry has been in a position to command the market for these logs because it can pay more for them than the sawmills. However, this competition has resulted in no serious loss because the sawmill industry can get considerable amounts of high-quality material out of logs of less than peeler grade, and until recently open log markets have been able to supply both industries. However, during the past year or two plywood manufacture has rapidly increased to a point where the industry must now go beyond the open log markets. Although there is no immediate shortage of peeler-log trees in the woods, a certain combing over of the large old-growth types will be necessary in addition to the normal logging for sawmills if the current demands of the plywood industry are to be met. Using tractors and trucks and working usually within a short distance of existing roads, small logging outfits have been buying trees of peeler quality, logging them, and thus supplementing the ordinary open-market log supply. Just how long the cutting of peeler trees in advance of regular logging will continue depends upon future demands for plywood, success in using logs of smaller diameter, and increased conversion of lower-grade logs, the last made possible by increased taping of face stock.

Ponderosa pine has not been used for plywood to any great extent as yet. There are two plants in California, with an annual capacity of 35 million square feet. However, there is good reason to believe that the output of ponderosa pine plywood will materially increase in the next decade. Large logs in the pine region are not nearly so common as in the Douglas fir region, and undoubtedly a larger area would have to be worked over in order to supply a good-sized plywood industry at any central point than would be the case in the Douglas fir region. An analysis of the Forest Survey's inventory data in three counties in eastern Oregon showed that 19 per cent of the 6 billion feet of ponderosa pine found in these three counties was in trees 40 inches and

over d.b.h. Although very little redwood has been used for plywood as yet, it is probable that the production of redwood plywood made from both rotary-cut and sliced veneer will increase in the future. In fact, there is reason to believe that the future increase in West Coast coniferous plywood will largely come from using redwood and ponderosa pine. Most certainly the size and quality of the redwood available lends itself to this product. In all probability the plywood industry in the future will not depend entirely on the logs produced for sawmills, but will get what it can from this source, and will send out its own agents to pick up available high-quality trees in advance of logging. This procedure may represent the first steps in individual tree selection in the region.

What can the forests of these Pacific Slope states do toward helping supply future pulpwood requirements of the United States? At this time practically all the pulp produced in the three Pacific states is made in the Douglas fir region of Oregon and Washington. In this region there are about 319 million cords of the so-called pulp species, in trees 16 inches and over d.b.h., in old-growth stands, not to speak of the understory trees in these old-growth stands and the more than 30 million cords found in so-called second-growth stands. Of these 319 million cords, 44 per cent is privately owned and the remainder is in some form of public ownership. If we set aside 30 per cent of this volume for saw-timber purposes, there is still enough in saw-timber stands alone, if carefully handled and thoroughly utilized, to take care of the West's present annual consumption of 1.9 million cords for over 117 years. The pulp industry in the Douglas fir region never has used small trees to any extent, and of late years has been breaking down relatively large logs for pulp. A computation in 1936 from questionnaires answered by the industry showed that of 1.9 million cords used in a normal year, 11 per cent would come from sawmill waste, 69 per cent from logs, and 20 per cent from forest wood. The use of large logs, which means less handling of wood material at the mill and also a cleaner pulp, is one of the favorable factors allowing the industry in this region to overcome the freight differential existing between it and eastern pulp-producing regions.

So far as raw material is concerned, the West Coast pulp industry can continue its present production for a long time to come. In fact, this region's annual consumption of 1.9 million cords of pulpwood, and even more, could be continued if only the pulp species trees over and above those needed for lumber, but cut incident to logging for the region's sawmills, were used. In other words, if all the hemlock, spruce, and balsam firs found on areas which are logged each year for material for the sawmills were thoroughly utilized, there would be no need to log directly for pulpwood. On the west side of the Olympic Peninsula is the largest single solid body of high-grade, virgin, old-growth hemlock, spruce, and balsam firs in the United States, an area of about 900,000 acres with a stand of 38½ billion board feet, log scale, for trees 16 inches and over d.b.h. The 7 million cords which the Hale Report states might be the Pacific Coast's annual quota if the United States should eventually be entirely self-sufficient in pulpwood, can be supplied by the forests in the Pacific Coast states. This rate of production could be continued, since the potential annual growth of the spruce-hemlock—balsam fir species in the Douglas fir region alone is around 8 million cords. The pulp supplies already mentioned do not include the 40 to 45 billion board feet of the balsam firs in California and the 11 billion feet of the

spruce, hemlock, and balsam firs in eastern Oregon and Washington, not to speak of the millions of cords of pulpwood available in ponderosa pine, Douglas fir, and lodgepole pine, all of which may be used in the future.

Accurate growth data are available for only the 29 million acres of forest land in the Douglas fir region, but on the basis of what we know of this portion of the three states, I believe the current annual growth for the entire forest area in the Pacific Slope states is over 4 billion feet, lumber tally. I will confine my remarks, so far as growth is concerned, to a few of the facts we have found out in the Douglas fir region.

Our experience in figuring growth in this region has shown us that total growth figures for a county, state, or region do not by themselves reveal the forest situation. For example, total growth figures in either board or cubic feet for a region merge the growth on small trees in remote locations with that on larger trees of merchantable or semimerchantable size on more available locations, and thereby many important distinctions are lost. In order to get at the real significance of growth, those interested must be prepared to consider many more data in much more detail than can be presented in a brief paper such as this.

In this particular region the current annual growth of 2.4 billion feet, log scale, is 28 per cent of the average annual depletion of 8.3 billion feet, log scale, for the decade preceding 1933. Incidentally, it is 46 per cent of the depletion of about 5.2 billion feet for 1933. However, ratios of growth to depletion do not mean very much, particularly in a region where areas of old-growth timber exceed those of young growth. In the last analysis they are only indicative of how far the forests in a region depart from normality. In the Douglas fir region we have about 9.9 million acres of coniferous growing types, 11.7 million acres of coniferous nongrowing old-growth types, 4.4 million acres of forest land either nonstocked or poorly stocked, largely due to fires following cutting, and 3 million acres of noncommercial forest and hardwood types.

There are three ways in which growth in this particular region could be increased: (1) better fire protection for the entire area, and particularly better methods of slash disposal so as to keep slash fires from spreading to the existing areas of second growth; (2) possibly some planting of the 4.4 million acres of forest land which is not restocking properly; and (3) cutting (either clean or selectively) the 11.6 million acres of old-growth virgin timber where very little, if any, net growth is taking place. If clear cutting is continued, any growth resulting from cutting the virgin timber areas will, so far as high-quality lumber and veneer are concerned, produce nothing of any consequence in the next two or three decades, whereas selective cutting, if scattered throughout the old-growth stands which are not too decadent, might add a few hundred million board feet of quality growth annually to the existing 2.4 billion feet of growth.

To sum up, California even though it may continue to export some high-grade specialty woods needs most of its forest products at home. On the other hand, Oregon and Washington have on hand and are growing far more in the way of forest products than they need at home, and can continue to export lumber, pulp, and plywood for the next 20 or 30 years. The production of sufficient plywood to meet all possible demands may involve some adjustments in current logging and manufacturing procedures, but the raw material is available. Whether all the production in Oregon and Washington available for export will be marketed in the United States or in Asiatic and South

American countries depends on national policies as to trade relations, tariffs, and embargoes, which is another story.

Chairman Winkenwerder: The next paper, prepared by R. B. Wolf, will be presented by R. S. Hatch, head of the Research Division of the Weyerhaeuser Timber Company.

Mr. Hatch: I shall have to start with an apology. When we began to get our figures together on the pulpwood available, the pulpwood consumption, etc., we ran into one of those situations where one group talks about log feet, another about cubic feet, and another about cords. We had to do a lot of gymnastics to get down to tons, which is the way the pulp manufacturer reckons. When we talk in terms of log feet, we run into astronomical figures. When we come down to pulp production and consumption, it is more like the national debt figures.

Mr. Hatch then read the following report.

WHAT WILL THE FUTURE PULPWOOD INDUSTRY REQUIRE OF PACIFIC SLOPE FORESTS WITH SPECIAL REFERENCE TO CANADIAN AND SOUTHERN COMPETITION

By R. B. WOLF

Weyerhaeuser Timber Company

ON the map, the present consumption of pulpwood in the Pacific Northwest is depicted graphically. The figures in the circles represent the number of million feet, log scale, consumed annually. Of the usually termed pulpwood species, this totals 1,174,000,000 feet, log scale. This is equivalent to 348,000 tons of sulphite pulp; 183,000 tons of sulphate pulp; 291,000 tons of groundwood; and 16,000 tons of soda pulp. In addition to this, about 70,000,000 feet log scale of Douglas fir is converted into approximately 70,000 tons of sulphate pulp. The Douglas fir which goes into this sulphate tonnage is mostly in the form of sawmill waste.

The Pacific Northwest Forest Experiment Station in Bulletin 17, under date of December 10, 1935, has covered the available present supply, the mean annual growth, and the expected annual growth of pulpwood species in this area in a most thorough manner. According to these figures, the realizable mean annual growth is approximately 1,800,000 cords. Some deduction must be made from this figure for pulpwood species used for saw-timber, so that the realizable mean annual growth used for pulp is somewhat over-balanced by present annual pulp productive capacity. However, as virgin timber is harvested the potential annual growth greatly increases. Under such conditions, we have in this territory a potential annual tonnage of nearly 3,500,000 tons as compared to present productive capacity of 1,325,000 tons.

It might be of interest at the moment to make this comment. As the saw-timber is logged from mature stands, we may expect approximately twice as much turnover from our land if it is logged for pulpwood, since hemlock grows faster and age requirement for pulpwood is roughly half that of saw-timber.

This demonstrates clearly the capacity of the Pacific Northwest to hold its own in world markets, so far as supply of raw material is concerned. The other factors are cost of production, including the value of the timber delivered at the mill, the cost of power, and the cost of labor; to which must be added the cost of transportation to the consuming markets.

Up to the present time, most of the pulpwood consumed in this territory has been a byproduct of the Douglas fir lumber and logging industry and, as such, its value is controlled by the cost of logging Douglas fir saw-timber. It is conceivable that the time may come when the situation will be reversed and the value of Douglas fir saw-timber will be controlled by the cost of getting out pulpwood, a situation now existing in the Scandinavian countries and believed imminent in British Columbia. Because of the ruggedness of terrain on which our timber grows and the consequent heavy logging costs, coupled with a severe tax on standing timber, the cost of pulpwood delivered at the mill is and probably will remain higher than like costs in the South. Against this higher cost, however, is to be considered the superior quality of pulp produced from the Northwest pulpwood species.

Power costs in the Northwest may be considered as low as in any other part of the country, since most of our power is produced from wood waste; and coming hydraulic power developments should keep this on a competitive basis with any other part of the continent.

Labor is undoubtedly higher in the Northwest than in the South, but as labor cost is about 15 per cent of the pulp conversion cost, territorial differences in labor rates have comparatively little effect on pulp cost.

A large proportion of the pulp produced in the Northwest is shipped by water to the East Coast consuming centers. Pulp is desirable cargo, and ocean freight rates are on a competitive basis with the rates enjoyed by southern pulp mills.

The above analysis indicates that Northwest pulp costs are higher than those in the South; but at this point the quality factors must be considered. So far, the pines of the South have only been converted on a commercial scale into sulphate. Experiments by Herty have indicated that pines of selected age may be used for ground wood and for sulphite, but the work so far done fails to show that the pines will make a sulphite pulp of a quality approaching that made from eastern spruce or hemlock and the true firs of our West Coast. Both western hemlock and the true firs have proven to be excellent sources of high-grade sulphite, as evidenced by the steady increase in consumption of pulps made from these species. Sulphate pulp made from western hemlock is equal to the highest grades of sulphate made in the Northeast or in Scandinavia, while southern pines are generally recognized as sources of pulp definitely inferior. This is largely due to the great differences in the fiber structure of spring and summer wood, as has recently been demonstrated by Curran.[1] It may, therefore, be safely assumed that the pulpwood species of the Northwest are especially well adapted for the production of both sulphite and sulphate pulps of such high quality that those cost differences which exist between the Northwest and the South are largely over-balanced by the quality factor.

This leaves open the field of utility of southern sulphate, both unbleached and

[1] Curran, C. J. Some relations between growth condition, wood structure, and pulp quality. Paper Trade Jour. 103(11):36-40. 1936.

bleached. There is an increasing demand for the lower grades of sulphate, which is being met by increasing production in the South. So far, Douglas fir has been, to a comparatively limited extent, converted into sulphate for the manufacture of boxboard and certain other paper grades where high quality is not so much a factor. Most of the Douglas fir sulphate is produced from sawmill waste. This raw material offers a potential powerful competitor to the southern pine, although in this case the South has so far produced a superior quality. It is rather difficult to estimate just what proportion of Douglas fir sawmill waste would be suitable for the manufacture of sulphate, but conservative figures, based on the operation of some of the large sawmills of the Northwest, indicate that somewhere in the vicinity of 1,000,000 tons of chips might be made available. This means that there is a possible sulphate production from Douglas fir sawmill waste of from 260,000 to 360,000 tons. However, this waste is widely scattered and much of it is not readily tributary to natural pulp producing centers.

There remains the question of Canadian competition. The forests of Ontario, Quebec, and the maritime provinces, while yielding an excellent quality of pulpwood, are slow-growing, logging costs are high, and as harvesting continues these costs will increase. It is safe to say that the Northwest has little to fear from competition of eastern Canada. In British Columbia, pulpwood species predominate over Douglas fir. It is believed that there is from twenty to twenty-five years of commercially available Douglas fir sawtimber at present rates of production. At the end of this period the pulpwood species must be logged for pulp production and not as a byproduct of saw-timber logging. It is well known that the terrain in British Columbia, especially on the mainland, presents much more difficult and costly logging conditions. This should in a large measure offset the lower stumpage rates and fixed charges prevalent in British Columbia, and should place this province on a more nearly competitive basis with our own Northwest.

In the foregoing discussion I have endeavored to outline in brief the future of the Northwest as a center of pulp production. The rapid strides made in the last ten years clearly indicate that pulp from the Northwest pulpwood species has made a place for itself in the consuming field, and the figures quoted indicate that a great and permanent pulp industry, backed by a substantial yield of raw material, may be expected. The South will undoubtedly take its share of the total available pulp business, but quality factors will always favor a permanent industry for the Northwest.

Mr. Hatch then added: It may interest you to have, in connection with this paper, some recent figures on pulp importation. In 1935, 1,733,792 tons of chemical pulps were imported into the United States. In 1936, if we take the rate up to August 30 and project it for the year, the importation of these pulps will be approximately 1,957,000 tons. All grades of pulp, including ground wood, imported in 1935 totaled 6,532,000 tons. So there is ample room for expansion of our pulp industry in the Northwest as well as in the South. These large amounts of pulp, coming largely from eastern Canada and the Scandinavian countries, place us in a position here in the Northwest, with our large supply of pulp timber, to proceed with our utilization of the species which are not so well suited to use for saw-timber.

Chairman Winkenwerder: President Chapman has a matter he would like to present for action before we go on.

President Chapman: I have a letter to

President Roosevelt which was adopted unanimously by the Council. I want to present it to this meeting for approval. It has not been released to the press.

"November 16, 1936.

"Hon. Franklin D. Roosevelt,
"President of the United States.

"Dear Mr. President:

"The Society of American Foresters, numbering 3,500 professional foresters, desires to extend to you its sincere congratulations on your reelection to office.

"Due to your personal interest and direct initiative, the conservation of our soil and of the biological resources dependent on it, of which forestry is the keystone, has for the first time in our history been undertaken in a broad and comprehensive way, has been made comprehensible to the vast majority of our citizens, and has consequently received their enthusiastic support.

"Under your administration the Civilian Conservation Corps has advanced the program for the management of our public forests by at least two decades and has improved forest fire protection throughout the Nation. The areas of National Forests have been substantially enlarged. A practical program of soil conservation, in which forestry plays a major role, has been instituted. The control of erosion and prevention of the silting of reservoirs has been extended to include entire watersheds. Retirement of submarginal agricultural lands and their devotion in part to forestry has received major consideration. Research into forestry problems and technique has been strengthened and extended.

"The profession of forestry, which for four decades has been the backbone of the movement for conservation and wise use of our natural biological resources, respectfully urges that the following principles be given your continued support and attention:

"1. That the technical and supervisory personnel of all federal agencies responsible for the administration of conservation measures be freed from the requirement that such appointments receive the approval of a member of Congress, and that they be placed entirely on the merit or career basis, as has been the practice in the U. S. Forest Service from its origin.

"2. That the Civilian Conservation Corps be continued as a permanent agency, under the above provision.

"3. That the program of acquisition of lands for National Forests be given adequate financial support, as an enduring monument to your administration.

"4. That sustained yield management of privately owned forest lands, in cooperation with public forest holdings, be encouraged by extending federal credit to such owners as qualify in their intention and ability to adopt this principle of management.

"5. That federal funds, under the Fulmer Act, be provided for the purchase of lands for state forests, thereby strengthening the state forestry departments, which are solely responsible for fire protection on all private lands.

"6. That the conservation of the biological resources dependent on the soil, namely, forests, wildlife, and forage, be recognized as constituting an administrative whole, and retained and concentrated in the Department of Agriculture, within which the conservation movement originated and which is best able to correlate these activities with soil conservation and other related agricultural problems.

"Respectfully yours,

H. H. Chapman,
President."

Mr. Weigle: I move that we approve this letter.

Mr. Cowan: It seems to me that the item on the program of land acquisition is not quite in order. As I have gathered the sense of this meeting, it has not been that acquisition of land for National Forests should continue.

President Chapman: Mr. Cowan is probably speaking from a viewpoint which is largely confined to this section of the country. In the East, the National Forests started from scratch in 1911, and less than 5 per cent of the forest land there has been acquired. This is a national organization and a national program. I don't think Mr. Cowan should object to extending the eastern National Forests when the West stands from 50 to 60 per cent without undue discomfort.

Mr. Cowan: You state they started from scratch. We are still scratching, and I am not prepared to say the program is altogether a good thing. Out here we are not any too satisfied with it, and why should we be? If we have found it is not good, why should we inflict it on the eastern states as well? After all, we stand as a lesson.

Mr. Wackerman: The statement is not in line with the policy adopted by the Council on the committee report of forest acquisition. Where in that report is it stated that acquisition should proceed? There is occasional reference to continued acquisition after certain fact-finding has been done. It seems to me it would be in line to recommend to the President that the fact-finding be done; then the acquisition could follow if desirable.

President Chapman: The policy approved by the Society five years ago provides for extension of the National Forests, with due consideration of private resources and when it does not interfere with them. That is where we stand by ballot at the present time.

Mr. Preston: I would like that letter to be approved, but I would like to see some recognition that this is a pretty big program and would cost a lot of money. I would like to see some indication that the foresters have their feet on the ground and an appreciation of what the program would mean in the national budget. I think we would get further if we recognized that feature, and did not put all the responsibility on the President or somebody else to consider this in relation to other things. Why shouldn't we, in our letter to the President, recognize that there are other demands on the public Treasury, and put it in a way to show that we realize we can get the things we want only so far as they can be arranged with our national affairs put in order from a budget standpoint? I don't like to see forestry responsible for proposals without any recognition of what the cost will be.

President Chapman: A letter like this to the President must be brief. We purposely made it brief.

Colonel Greeley: I don't think that the Northwest wishes to be left out entirely of the federal acquisition program. Mr. Tinker, in his address of yesterday, laid down a broad basis for federal acquisition that I think meets our situation, and also the situation in other portions of the country. That broad basis was, in effect, that the federal government does not seek by public acquisition to displace private forest management wherever private forestry is practiced, nor does it seek to displace State Forests wherever State Forests are possible; but it rather assumes the role of filling in the gap and stepping in to meet situations which neither private forest management nor State Forests can meet. We have such situations here in the Northwest.

With all due respect to the opinions of my friend Major Cowan and others, we

have situations here where, as far as many of us can see, extensive federal acquisitions are necessary to establish the forest values on which this whole conception of sustained-yield management must depend. Where we have those situations, just as where the South or the Northeast may have them, we certainly, from my viewpoint, do not want to be left out of the national acquisition policy.

I thoroughly concur with the conception of broad planning. I thoroughly concur in the idea of coordination of National Forest extension with the state forest programs under the broad conception of giving a clear road for private forest management wherever it can handle the situation, and for state ownership where the state can handle the situation. I certainly don't want the Northwest put in the position of being left out of the federal acquisition program entirely. I second Mr. Weigle's motion.

Mr. Norman G. Jacobson: I am speaking as a private forester, and also as a representative of a lumber company of Washington. I absolutely second Colonel Greeley's ideas. We want a little competition between the state and federal government, so far as land acquisition is concerned, in the development of forestry in the state of Washington. I think the thing can be worked out, and I think that, to fill out economic units, the National Forests should acquire many areas within or adjacent to their boundaries. I think it would be very serious for us, as foresters and timber owners of the West Coast, to get the idea we don't want the federal government to come in further. We want and need their help, and certainly the states need a little competition to get some action.

President Chapman: If there is no objection, I will put the question. All in favor of approval of this letter say "Aye". Contrary minded, "No". The motion is carried.

Chairman Winkenwerder: We are now ready to proceed with the discussion of the two papers you have heard this afternoon.

DISCUSSION OF PAPERS

Mr. E. J. Hanzlik: We know that the price of hemlock pulpwood is below the actual cost of getting it out. When hemlock logs get to be of real value, can our pulp compete with pulp from eastern Canada and the Scandinavian countries? Can we keep our pulp cost low enough to compete?

Mr. Hatch: Without any question, we can keep our pulp costs in direct competition with eastern Canada. The question of Scandinavia is a little bit different. Most of the Scandinavian forests have been written off entirely; and the countries depend upon their forest industries almost for their very existence. Consequently Scandinavia will always be a principal competitor to the Northwest, and the chances are that Scandinavian pulp prices will control the market for many years to come.

Professor Fritz: Mr. Andrews' paper is full of good ideas and things to think over. I don't want to discuss the whole paper, but there are a few things I noted down. California was mentioned. As to the redwood, I don't look forward to any great increase in its use for plywood. We had one plywood plant, at Martinas. It is now closed. The logs were brought down about 250 miles to it. One very bad feature in redwood, that makes it difficult to put the logs in the lathe, is that most of the logs have a very large rift crack. It

extends clear across the center to within three to six inches of the outside. When put in the lathe the log must be cut carefully, without coming to the rift. We might be able to split the log and butt it on the back stay log, then use a rotary process, or might slice it. It doesn't make the style of veneer we would like to have.

Something was said about California being an importer and needing all of its own lumber. That requires some qualification. California *is* an importer. I think for a while it imported something like 3 million feet, but that is lumber needed for general building, and it is very cheap. Oddly enough, only in the past ten years or so have the Sierra pines been seen in the local markets. The common grades have gone very largely into box lumber. Now the common grades are going less into box lumber because of the fiber package, and are going more into the local retail yards. That isn't a great deal. Most of the lumber from California, especially the ponderosa and sugar pine and redwood, is high-grade lumber, and there isn't enough market in the state for those high grades, and they have to be shipped out to a market.

White fir was mentioned. I wish it were possible to make some use of it for pulp. Certain studies have been made for pulp mills, but apparently a number of things are against it. One of them, a very important one, is an insufficient supply of water. The streams are not sufficiently high all the year round. That is the way I understand it; I may be wrong. It would be very nice if you would run short of hemlock up here, so we could make our white fir into what you call forest wood and ship it to you by railroad.

Mr. Preston: I am somewhat familiar with the pulp and paper situation, mostly in Canada and the South. I am in sympathy with the statements made in that paper. One or two might possibly be questioned. One was that the Northwest does not need to fear the competition of eastern Canada. I am not sure that was the statement, but something along that line.

The Northwest, of course, has exactly the same kind of wood to furnish to the paper industry that eastern Canada and the eastern United States have. That is the great group known as the sulphite group, the spruce, hemlock, and fir. The Northwest has mostly hemlock, whereas eastern Canada has spruce. The western hemlock makes practically the same quality of pulp as is made out of spruce in eastern Canada and the eastern United States. Both regions will be able to make a pulp and a paper of a quality superior to that from southern pine. I realize that some statements and propaganda are to the contrary, but I think the general feeling among pulp and paper people is as I have said, because of the inherent qualities found in spruce. That does not mean by any means that the pulp and the paper made from southern pine by the sulphite process cannot compete with the product of the Northwest or the eastern Canadian woods. Most of us concede that the South will be able to make a paper which will compete on a price basis; a paper that people will be willing to accept and use because it is cheaper. At the Atlanta meeting of the Society last winter there was quite a discussion of the economics of the subject; and Mr. Kellogg brought out that there is a degree of financial strength in the northern paper mills, including those in Canada, which assures vigorous competition. The paper industry is too well entrenched in eastern Canada to allow its market to be taken without a stiff fight, and they have facilities for fighting which may be quite remarkable. In other

words, there is a certain financial control that perhaps has been overlooked.

Mr. Edward L. Joy: What effect will the completion of the St. Lawrence waterway have on this problem?

Mr. Hatch: It will probably have the effect of lowering the freight rate on Scandinavian pulp into our middle-west consuming centers. We do not consider eastern Canada as dangerous a competitor as Scandinavia, for the reason that I have already given: Scandinavia mainly depends for its livelihood on the forest industry, and those forests are old forests; they have largely been written off. The Scandinavians can bring their wood into the mills at any cost they choose to place on it, simply to keep more people employed and keep more mills going. Consequently, for a long time to come we must expect Scandinavia to control the price of pulp in the world markets. However, there is another point to consider. Scandinavia is now cutting the annual growth, and the laws are very strict against overcutting, particularly in Sweden. Scandinavia has pretty well reached its peak of production. Consequently, as our population and our national consumption increase, Scandinavia will play a less important part in the world market. The West has an opportunity to supply a much greater potential market for pulp than the present consumption.

The Chairman then called for presentation of the following paper.

SHOULD QUALITY OR QUANTITY BE THE GOAL OF OUR FORESTRY?

By GEORGE F. CORNWALL

Managing Editor, The Timberman

IN HIS satirical analysis of the foibles of humanity, Jonathan Swift created the Lilliputians and the Brobdingnagians. Through his immortal Gulliver, the world was endowed with a never-fading picture in contrasts. Swift's classic portrayal of the crudities of the colossal and the delicacies of the diminutive remains a literary object-lesson after 200 years, which should teach us that, in this age-old controversy between quality and quantity, the preponderance of the evidence favors the plaintiff.

On the other hand, in dealing with such perverse matters as abstract forestry, which in the opinion of some of us has not yet attained the status of rational behaviorism, the converse of Swift's deduction appears to be true. Certainly it is, if we persist in using sawn lumber as the principal yardstick for measuring timber values. For indeed, it is the big, old tree that represents today's ideals of quality in grain and fiber, and it is the diminutive tree that produces the spawn of coarse and often unwanted material.

When we shall have stripped away the last vestige of our virgin timber, only patience and age can restore quality as we know it today. Quality will be represented by those relatively few trees that survive the perils of fire and disease or dodge the economic hazards of taxes and carrying charges. If quantity is all that matters, we should be able to achieve it by the mass production principle of short rotation.

From what I can learn so far, neither forester nor lumberman can yet make up his mind, with any comfortable sense of security, which of these two philosophies

to embrace. And I am convinced that, after we dump all the divergent ideas on this controversial subject into one common pot, it is going to take a vast amount of stirring to turn out a forest policy with a texture smooth enough to satisfy all the contributors to the recipe. I reach this inescapable conclusion after a reasonably thorough canvass of current forestry opinion.

In some minds, the question propounded by the very title of this paper seems to answer itself, since quality and quantity commonly occur together. It is argued that the most useful trees are those which reproduce rapidly and heavily in the regions to which they are best adapted. Their specific use, either in the form of lumber or cellulose, will depend upon the age they are permitted to attain, for economic conditions combined with technical progress in the wood pulp field make it exceedingly difficult to prophesy just how big our future trees need to be.

We also have foresters who dismiss the subject with a shrug and a suggestion that we merely go on planning our forestry in the simplest possible way to secure the best trees for general purposes. By letting nature take its course, good trees will come from the thickest stands, and thus quantity will beget quality. This group refuses to think of trees in terms of cellulose, declaring that there are hundreds of other sources of this product. They urge, and with convincing logic too, that growing forests be brought to their fullest maturity, seeing therein many economic and aesthetic values on which neither industry nor commerce can lay legitimate claim.

In the hope of further guidance and enlightenment, I have, with deliberate intent, conferred with certain friends in the pine industry of the West, whose timber lies in regions of slow growth. When asked abruptly to choose between the doctrine of quality and quantity, the response of one prominent operator and disciple of practical forestry presented a striking parallel to the poor, squirming witness who was asked by a magistrate if he had left off beating his wife. Along with the rest of us, he has found the proposition can't be answered without qualifications.

Our pine operator is perfectly willing to endorse the doctrine of quality on promising sites, where rainfall and climate are favorable for tree growth. He admits such possibilities in the redwood region, the coastal fringes of Oregon and Washington, and in certain areas in the southern pine states, but he confesses that he sees little sense in waiting for quality to return on arid uplands, where the soil is poor, the rainfall scanty, and where tree growth is slow and the owners proud of it.

Quality, he argues, is essential only in the narrow sense of the objective. Quality is desirable in matters of species and management, but quantity is the thing he would seek in the fundamental sense of producing the maximum tonnage of vegetable matter per acre. Our pine man would waste no time yearning for the return of the tall, straight-bodied trees needed to produce the long, wide clears so highly esteemed in today's markets.

He regards the trend of industry to be definitely toward synthesis. Already, we know how to make passable imitations of leather and silk from cellulose, as well as a great variety of moulded products. In the eyes of the lumberman, definite forms of competition have already arisen from pulp products. Clears, selects, and even shop grades mean nothing to the chemical wood plant. Only wood fiber is essential.

Nobody would be foolish enough to say that we have achieved the ultimate in wood-fiber utilization. Indeed, it is far more likely that we have seen only the beginning, and that before the century closes our descendants will have

learned to supply most of their building material requirements from synthetic products not yet dreamed of, and conceivably at a cost that may represent only a fraction of the sum necessary to nurse a forest to full maturity.

It has also been suggested that we look to Europe for the answer to our problem. If we do, I rather incline to the notion that the quantity theory will come out on top. In the very cradle of forestry, timber owners in Europe proudly display areas covered with thrifty trees, designated by them as saw-timber, which in point of size would scarcely pass for telephone poles in this country. Annual increment is stressed above all else in most cases, and from the European standpoint these trees do themselves proud. But what a tree actually contains in the way of usable material does not always concern the European forester. I believe this to be a fact, because as a member of a pioneer American forestry delegation invading Central Europe two years ago, I could not help sensing a feeling of reluctance on the part of foresters to allow us to devote any appreciable amount of time to a study of sawmill operations, where we could see for ourselves what sort of lumber was being sawed from the timber we were inspecting. As Americans we have been schooled to consider trees in terms of sixteen-foot logs. In European eyes the scientific angle comes first. If I am correct in my belief that most European foresters are primarily concerned with vigor of growing stock and not so much with final utilization, then it would seem to me that they are mainly interested in quantity and that is the answer we might expect from Europe. No criticism is intended. I simply record an impression.

Perhaps we shall all move along faster toward our goal when we begin to regard quality as a purely relative term. The quality of timber in the future is not likely to be quality we know today. It will simply represent the best we can produce under the most scientific methods we can evolve, within definite time limits set by economic conditions. Judging from European standards, 150 years may be considered a mature age for a timber stand, from which to expect a fair volume of quality timber. Trees of this age will yield limited amounts of clear grades, whose deficiencies in length and width will probably be overcome by skillful veneering and gluing operations.

In the field of utilization, plywood indicates a means of combining quality with quantity. In a three-ply panel, not more than one-third of the material need represent quality. The other two-thirds, comprising core and back, may be of lower grade. Thus a relatively small amount of clear lumber is all that is required to yield an item which to all intents and purposes is a wide, clear board. The resultant product, made with water-proof adhesives, is the equal if not the superior of sawn lumber in many ways. It can be used in much thinner form than lumber without sacrificing strength. Plywood requires less volume of wood, and hence entails less drain upon the forest.

The growth of the plywood industry all through the depression years is one of the bright spots of our Pacific Coast lumber industry. The Douglas fir plywood output rose steadily from a total of 300 million square feet in 1930 to 700 million square feet in 1936. The rapid strides made by this material, and the countless new applications found for it year after year, indicate the importance of considering the plywood industry from a forestry standpoint.

On the purely quantitative side of the wood utilization picture, we have also witnessed a phenomenal growth in the insulating board industry, whose output this

year is estimated at nearly 600 million square feet. True, this product represents some displacement of sawn lumber, but in most cases it caters to entirely new fields and applications. In this rising new industry, quantity rather than quality characterizes its raw material requirements.

Even in the veneer and plywood industry we see occasional bits of evidence that suggest that quality timber may not be needed in such large volume in the future. Thin veneers of genuine hardwood are now being attached to fiberboard sheets with waterproof adhesives. The resulting material affords all the charm and decorative possibilities of solid lumber or plywood. Likewise, we are now gluing thin hardwood veneers to metal sheets, and also making hollow shapes of plywood, possessing all the strength of solid members with only a fraction of weight and contents.

In my judgment these are a few of the signs that indicate that quality may not be as big a factor in the future as some observers are inclined to suspect. Indeed, it seems to me we will actually need less quality material from year to year, if technical progress continues its pace. We shall want sufficient quality in our timber to satisfy the human desires for genuine wood surfaces, along with an ample supply of ordinary wood to produce the necessary volume of cores and fibrous materials.

In any discussion of quality and quantity, let us not lose sight of the fact that wood chemistry may some day find more quality in our so-called "weed" trees than it will in our majestic pines and firs. Our hemlock and white woods are rapidly coming into their own because of their superior pulping qualities. Their ability to reproduce rapidly, coupled with their desirability for pulping purposes, may easily rate them as quality materials in the chemist's eyes.

Logging methods seem to have a definite place in our future scheme of forestry. We already know that selective logging will do much to improve the quality of our second-growth stands, as shown by experiments in the redwood region and elsewhere. These studies indicate that better results can be expected in selective logging than by clean cutting. Subdominants in uneven age classes are usually free from limbs, for one thing. When released from suppression they begin almost at once the task of laying on clear lumber growth. The selection system offers a direct incentive to quality, whose importance must not be overlooked.

Whether we grow timber for quality or quantity, let us not lose sight of this fundamental principle: Forestry expenditure and effort, whether it be on private or public lands, must not attempt to compel maximum production in regions unfit to compete. Rather, let us concentrate our efforts on lands where the highest possible return will be assured to industry, community, and consumer of forest products. Only such volume as we can obtain economically should be sought from less favored regions. As Forester E. T. Allen once remarked: "Any attempt to do more is as fallacious as to insist that Montana maintain the orange supply."

DISCUSSION

Colonel Greeley: The West Coast Association recently made up a composite of the Douglas fir log, based upon the actual sales of our mills over a considerable period. We found that 21 per cent of the average Douglas fir log produced clear and shop grades of lumber. Another 11 or 12 per cent produced structural timbers of exceptional dimensions. So about one-third of the average Douglas fir log goes into what you might call quality products. Then came the second third, producing our Number One grades of timbers, plank dimensions, and boards, the breadbasket of the industry; and below that was the final third of the low-grade products, the Number Two and Number Three grades of boards, dimensions, mining timbers, and the like.

Now, taking the Douglas fir industry in a good year, not the kind of year they have been going through but in a good year, you might say that the middle third of the log has been brought out of the woods and manufactured and sold at approximately the cost of production; the upper third has yielded a profit; and the lower third has been produced at a serious loss. Broadly speaking, the financial problems of the industry might be stated in very simple terms as whether or not it could make enough money on the best third of its log to offset the losses on the lowest third.

But this doesn't begin to tell the whole story. One of the very helpful surveys made by the Forest Service was a study of logging in the Douglas fir region, I think made in 1936. It gave us an astonishing figure, that the material of lumber quality left in the woods by the Douglas fir industry was equivalent to about one-sixth of the production of fir lumber. In other words, aside from the average Douglas fir log, another large amount of material is wholly discarded in our logging operation. And that waste today is practically the same as it was in 1926. And for us lumbermen and loggers, one of the uppermost problems in our minds is, What can we do with our low-grade logs? What we can do with them and with the surplus of low-grade lumber at the sawmill will be for a long time to come one of the tough problems of the industry.

Perhaps my nose has been too close to the grindstone; perhaps I am looking at the matter with too immediate a slant and not with a sufficiently broad vision of what the future may bring us. But consider the factor of labor cost. Approximately one-half of the cost of making a thousand feet of Douglas fir lumber is paid out in wages, an average of 68 cents per hour, between $9 and $10 per thousand feet. That average cost for wages is not materially different between the low-grade and the high-grade product. And it is beyond my comprehension to picture a time when we shall not be cursed with quantities of low-grade material.

Of course, that relates directly to our geographical position, our distance from the great markets of the country where low-grade lumber is consumed in the largest proportion and volume. It is also directly related to the fact that these same low grades of lumber which constitute our problem are the grades of lumber most widely and most profusely produced in all parts of the country. And when I hear from my friends in the southern pine region of their tremendous areas of second-growth pine gradually approaching the size when they may be converted into lumber, in addition to their present enormous production of these same grades, with which we must com-

pete at long-haul freight costs across the country or through the Panama Canal, I again wonder what the future holds in store for our production of low-grade logs and low-grade lumber here in the Pacific Northwest.

While we hope and believe that the age of cellulose and wood chemistry is going to provide many additional products and outlets for our low-grade material, yet so far as I can see, for at least as long as this generation of foresters is in the picture, finding ways to dispose of low-grade lumber in the Northwest is going to remain one of the outstanding problems of the lumbermen and the foresters. But there are indications that the country is still going to demand high-grade lumber, lumber measuring up to the old standard. Take for example the recent development of the timber connector as a new type of timber construction, again putting timber into the competitive picture with steel and some of the other materials to which we have lost ground. You can't build a high-grade oil derrick or trestles for big structures out of low-grade lumber, with timber connectors or any other device. In other words, the markets of the future, as I see them today, are going to require high-grade materials; and certainly in our position here in the Pacific Northwest, with our high labor costs and with the quality we have to work with, I would not like to see the industry or the foresters in our industry take the position that we are going after mass production of quantity rather than a continued production of quality.

Mr. A. Whisnant: I am the Secretary of the Pacific Logging Congress. Many of you know me—I hope favorably. I didn't expect to speak at this convention, because for lack of certain scholastic attainments I understand I am not eligible for membership. I also understand that neither is the past President of the Congress, E. P. Stamm, eligible. Neither is L. T. Murray, a previous President; nor Harry Shellworth of Idaho. These men, however, have done a great deal in the sustained-yield field, in a practical way.

Someone has said that the logger is the dreamer. If this is true, then the Pacific Logging Congress represents the dreamers of the industry. Scores of men present are members of the Logging Congress, and you know that you have dreamed dreams and seen visions.

Colonel Greeley, after listening to your address, I have come to the conclusion that you have lost sight of some of the visions which stirred you a quarter of a century ago, and that you have failed to glimpse the dream so ably outlined by our younger friend, George Cornwall, in his masterly address. I wish to lend my endorsement to Mr. Cornwall's dream, rather than your theory, containing as it does implied criticism.

You spoke in defense of the invested capital in sawmills, all of which has a bearing on our great industry; but the future of the sawmill is at least problematical. Science today has proven, and there are many practical operations, that the fiber in the wood can be converted into a usable product without the wasteful methods of the sawmill.

The logger is ahead of the sawmill man in the adoption of new equipment. Ten years ago the tractor, the old clanking tractor which is everywhere in the pine woods today, was practically unknown. It is making great inroads into the fir areas, and it has also gained a tremendous foothold in the redwoods. Through the use of the tractor, only, can the principles of sustained yield, which has been one of the keynote topics of this meeting, ever be attained. Ten years ago hardly a stick of timber was being taken out of the woods by tractors. Had a sustained-yield policy been adopted, with the logging methods prevailing at that time, it would have failed to accomplish its purpose. Had a sustained-yield policy been

erected three years ago, without taking into consideration the transportation of logs by trucks, it would have failed to accomplish its purpose. The combination of the tractor and the truck, together with other improved logging methods, has made remote and scattered areas of timber accessible and has changed the entire complexion of that phase of the lumbering industry. The loggers of the Pacific Coast have junked their old equipment and adopted new. Perhaps the time will come when the sawmill, with its wasteful methods, will be relegated to the past, and capital will be invested in new equipment designed to convert the smaller timber and the so-called second growth into a synthetic lumber with greater economy and less loss. When that time comes, perhaps the Nation will see its way clear toward attaining sustained yield.

The logging industry, for the most part, is composed of young men. They are the dreamers of the industry, and I see no reason why at least some of the dreams of men should not come true.

Chairman Winkenwerder: I want to say that Mr. Whisnant and the other good friends of mine whom he has named have done a great deal for the advancement of the logging industry here in the Pacific Northwest.

Professor Fritz: I come before you as a dreamer.

Mr. Whisnant said something which makes me refer to last night's meeting. I think the meeting and discussion offended a very important part of the woods group with whom we have to work. The man who addressed you last night as an engineer, and not as a forester, is the man from whom we got the idea of using the tractor in the redwoods. He deserves as much credit as anyone for the original ideas in selective logging in the redwood region.

Mr. Cornwall's paper took up the subject of quantity versus quality on a very broad scale, lumber, wood pulp, plywood, and so forth. I was under the impression from the title of the paper that it was to be limited to lumber. If you consider only the lumber, you can't get away from the fact that a high-grade board has a much wider range of utility than a low-grade. That is recognized by the buyer. He is willing to pay more for it. The lower your grade, the narrower the range of utility and the less you can get for it. Therefore, why not try to get as much of that high-grade material as you possibly can? Furthermore, it is the high-grade material which must carry the burden of producing the low-grade. As I tell my classes, the little apples are on the same tree that produces the big apples.

One important means of producing high-grade material in the future was referred to by Mr. Cornwall when he mentioned selective logging. In selective logging you have on the land for a number of years trees with stems which are free of branches. If the trees respond with accelerated growth, you are producing on the outside of the earlier nucleus a goodly portion of high-grade material. That high-grade material is what you want in the future. The South and the European countries produce largely commons. Let's try to produce the high grades, not only for our own use but also for the people that get their commons from the South and from Europe.

Just a word about pulp or cellulose. If we should see a wider chemical utilization, and I hope we do, and our so-called lumber is made through processes that will utilize the tree much more closely, less acreage will have to be covered. It might take fewer hands. It might take many more hands, however, in the plant. I wonder what that will do to the sustained-yield set-ups that the dreamers are dream-

ing about. I mention this only to show that plans made are so easily knocked into a cocked hat by some major improvement.

Mr. Munger: Arthur Koehler, of the U. S. Forest Products Laboratory, whom you remember in connection with the identification of the wood in the Hauptmann trial, expected to be at this meeting; but finding he could not be here, he sent to the Program Committee the following comment on the topic of Mr. Cornwall's paper, which he had not seen.

"I do not know what the trend of Mr. Cornwall's paper, 'Should Quantity or Quality be the Goal of Forestry?', is going to be; but the very fact that the question is raised makes possible the surmise that he is going to advocate that more attention should be paid to *quality* production. That surmise is based on the fact that, in the past, *volume* production almost entirely has been the goal of forestry and the basis on which financial returns were calculated.

"The almost exclusive emphasis on volume production heretofore has been due to a number of factors, chief of which, I believe, are: (1) the large degree of variation that occurs in the quality of wood of the same species is not fully appreciated; (2) volumetric measurements are comparatively easy to make, whereas the quality of timber is difficult to determine and evaluate; (3) volume is a fairly definite factor, whereas quality is a changing factor which varies with the years and with the uses to which the wood is to be put.

"Nevertheless, the wide spread that occurs in the price of upper and lower grades of lumber should in itself be a strong incentive to pay more attention to growing timber of better quality. Furthermore, natural defects, as commonly recognized in the commercial grading of lumber, such as knots, shake, accumulations of pitch, decay, and mineral streaks, do not give a complete index of wood quality. There are numerous other inherent factors that lower the value of wood for specific uses that are not considered in grading lumber. Some of these are: small size, crook, and excessive taper of the tree trunk; internal stresses in the green wood; spiral grain; low or high percentage of heartwood; nonuniformity in rate of growth; too low or too high density; tendency to warp and crook; compression wood, and other types of undesirable abnormal wood. These fac tors influence the quality, and hence the usefulness and price of timber, to a con siderable extent in many cases.

"As the virgin timber is cut out there will be an increasing scarcity of high-grade lumber of most species, and probably a corresponding superabundance of low-grade material which will further accentuate the demand for wood of good quality.

"Before wood of specific quality can be grown, however, it will be necessary to know what conditions will produce that quality. This requires the ability to appraise properly both growing conditions and wood quality and to determine the relationships between the two. It is a field of research that has been given altogether too little attention in the past.

"Furthermore, some standards of quality will need to be set up as a goal. Though straight trees having little taper in the merchantable part of the trunk and having wood that is straight-grained, even-textured, with few knots, and no abnormal wood or decay infection would be suitable for practically every use, it no doubt will be more economical in growing timber to establish utilization standards that will discourage high-grade, expensive woods in uses that can be fulfilled equally well with low-grade inexpensive woods. In

any event, a common error to fall into is to take present utilization standards as a guide to future timber requirements. Utilization standards will have to be changed materially as second-growth more and more takes the place of virgin growth and as new developments in timber utilization are put into practice.

"In conclusion, I would say it seems that what is needed is not to make either quantity or quality the goal of forestry, but to make the most desirable compromise between the two, with which I feel certain Mr. Cornwall will agree. To grow the best possible quality of timber will in most cases not be practicable on account of the cost; to aim only at the maximum volume production per acre may equally defeat obtaining maximum returns on the investment."

While I am on the platform, may I add a word of comment of my own on this subject? The topic of quality versus quantity products is not merely a subject for academic discussion. It is really a very practical, eminent problem for the forester of this region. Recent developments in logging engineering, noticeably the tractor and truck, have made possible a degree of selectivity that was not possible heretofore; so that it is now possible to direct timber management so as to alter the quality of the crop that may be produced some decades hence. In the ponderosa pine region that is possible by an adjustment of the percentage of the cut, of which Mr. Brandstrom told us yesterday. It would have a very material bearing on the quality of timber that is realizable in the next cutting cycle. In the Douglas fir region, where clear cutting has heretofore been practiced, it is now physically possible to remove a portion of the stand and leave the middle-sized and smaller trees for subsequent growth. It is my opinion that the process of selectivity has certain hazards and certain expenses, but it also has corresponding possibilities for increased revenue in the decades to come.

The question is, is the spread between high-quality timber and low-quality timber going to continue on such a basis that it will pay to undertake the added expenses and hazards of selective logging to realize those higher returns that the high grades of lumber will bring in the future, in comparison to what low grades will bring? It is of course difficult to predict what the long-term future has in store for us, but I think we must bear in mind that nothing can compete with the cheap inch board. It has a wide variety of uses, and it is inconceivable that substitutes can replace it. On the other hand, I think quality lumber has a multitude of substitutes, both in synthetic wood and other materials, that would subject it to all kinds of competition should the upper quality of lumber get too high priced. My thought is that a practical question before timber managers of the present time is whether they forecast a sufficient premium on quality to justify timber management with a view to growing a higher percentage of large-size, quality timber.

Mr. Norman G. Jacobson: For a number of years, as you all know, I was a disciple of E. T. Allen. The lesson I got from his teaching and from working with him was that you can't apply blanket rules to forestry; and this is a case in point. If you go out to buy Douglas fir stumpage in the state of Washington, you will pay practically as much for the fir that will make railroad ties as you will for high-grade yellow fir. It is a question of accessibility. Thirty or forty miles back in the hills takes enough off the value of high-grade stumpage to bring it down to practically the same value as your lower-grade, fast-growing Douglas fir in stands 30 to 40 or 60 years old. I think we older foresters have been asleep at the switch. A lot of this low land that is

adjacent to the big towns and cities is intermingled with farms and is producing a great deal more than we look forward to. We are going through the same history as that in the South. I think that is the territory we should have our eyes on, a great deal more, perhaps, than some of our high mountain territory. As time goes on, economics will solve the question at what age or size our timber is going to be cut.

I am going to throw out a thought on what Mr. Brandstrom told us yesterday about the operation at Burns, Oregon. I asked some other foresters what they were cutting at Burns, and I was informed that they were cutting practically the same grades now as they did before they started the use of selective logging. I can't figure it out but that is the situation. There are probably some elements there that confuse us, but a discussion on blanket lines about an entire territory very often confuses many of us, and the real opportunity in the second-growth stands that are going to reach maturity in a few years may be overlooked.

Prof. Kenneth Pearce: Colonel Greeley beat me to the draw when he brought up the subject of timber connectors; but I may mention a further development with which some of you may not be acquainted. That is the development of structural grades which enable the lumber manufacturer to offer timbers of guaranteed working stress. In the state of Washington there is what I think is a rather unique organization, The Washington Timber Products Council, composed of architects, engineers, lumbermen, and foresters, mainly forest engineers. If what has developed from the meetings of the Council is any indication, and if the great interest that architects and engineers have taken in structural grades and in modern wood connectors and other new joints, which enable the engineer to make more use of the strength of wood, particularly its great tensile strength—if all these things are any indication of what may develop in other parts of the country, I think we are going to see a great increase in the use of structural grades, and that structural timber of guaranteed working stress is going to be better able to compete with steel and other materials in certain types of structures that use a large volume of timber. That may be a straw which shows which way the wind is blowing on this question of quantity *versus* quality.

Mr. E. P. Stamm: I am interested in both phases of this subject. I think our company (the Crown Willamette Paper Company) has the finest grade of veneer logs to be found anywhere on the Pacific Coast. We sold a raft the other day, 775,000 feet in 25 stick raft average, better than 5,000 feet to a log, beautiful yellow fir. We also have a lot of low-grade hemlock to work up into fine paper. Our stands of timber vary widely. We have much small spruce, some large spruce, some airplane spruce; also a lot of hemlock, white fir, some red fir and cedar, and some beautiful yellow fir.

When you look around and see the volume of yellow fir still remaining that is suitable for high-grade plywood, it seems inevitable that the plywood manufacturers will have to make the outside sheet pretty thin in the near future, and spread it over a lot of surface feet. On the other hand, I am firmly convinced in my own mind that in the very near future such articles of lumber manufacturing as molding, doors, window frames, special shapes, and so forth are going to be made from chemical pulp.

We make a great deal of ado about high-grade wood finish; and yet when we go into buildings that have been finished and reconditioned in the past few years,

we rarely see any natural grain in any of our Pacific Coast woods. They are enamelled, painted, and covered until you can't recognize what kind they are. I feel quite certain these shapes, especially molding, and these other uses that I have enumerated, are going to be made from chemical pulp having incorporated in it a preservative, with some affinity for paint, so the product will take enamel and a good finish and make far better molding or specialty wood for interior decoration than we have today.

I can't see how it is possible that we are going to grow much quality wood. The fine, big timber is rapidly disappearing. We as a people are too restless to wait two or three hundred years to grow other good wood, and we are going to take what we have and manufacture quality products from the material at hand; and it is our job to do a first-class piece of work in it.

At this point the Chairman called for presentation of the following report.

REPORT OF THE COMMITTEE ON SOIL EROSION

THE increasing prominence of activities connected with erosion and watershed protection justifies a report at this meeting, although the continuation of the Committee has been in question during much of the year, and although, for the same reason, little progress has been made by subcommittees on the program as originally outlined. Thus quickly passing over our sins of omission, we may proceed to aspects of this subject which amply merit consideration by the Society.

Accelerated soil erosion is the obvious manifestation of a "diseased" watershed condition. Actually it is the final stage in a series of processes, beginning with the disturbance of the vegetation and passing through varying degrees of exposure of the soil to the action of wind and water. Control of erosion is essential, but foresters do not need to be told that coolly planned prevention will save a lot of hotly fought suppression. And prevention of erosion takes you back to the vegetation and the water, every time. Maintain the vegetation and control the water, and erosion will take care of itself. If support for this contention is needed, it may be found in the recent reports on upstream engineering and water resources, in which strong and welcome emphasis is placed on the essential role of forest and other cover in water conservation. Your Committee can be far more useful by broadening the scope of its activities to include the whole subject of watershed protection than by limiting itself to erosion, as its present title implies.

The place of foresters in the rapidly developing activity of erosion control and watershed protection becomes one of concern and importance, both to many individual foresters and to the Society. Active participation in erosion matters is by no means confined to foresters. Engineers, agronomists, ecologists, geographers, geologists, soil scientists, and economists concerned with land planning are all directly and often aggressively interested. In this report, those concerned primarily with range management are included with the foresters. One of the most significant developments has been the adoption by large organizations, like the Soil Conservation Service, the Tennessee Valley Authority, and the Forest Service, of a coordinated attack upon these problems by representatives of several or all of these scientific or professional groups. Two points stand out. First, close cooperation is essential. Sec-

ond, in certain parts of the field, such as nursery work or land planning, foresters must demonstrate their fitness in competition with members of these other groups.

Where does the forester fit in to this picture, and is he taking the place for which he is qualified? Three phases of watershed protection may be recognized in which the forester should be better qualified than representatives of the other groups to plan, execute, or direct. The first would include matters involving the ecology of natural vegetation and its applications. The second would be in the seeding, planting, and tending of vegetation on wild lands. The third would be in the management of protection forest areas or of wild lands in which watershed protection becomes a primary activity. The theory and practice of these three phases of watershed protection should be familiar to every forester. He should understand the influences of natural vegetation on the site and, consequently, upon water and soil. He should be able to decide as to the adaptability and usefulness on specific sites of native species selected on the basis of their ecological characteristics. He should be able to handle nursery and planting practice with suitable species. He should be able to organize protection from fire, insects, and diseases. He should be able to guide the tending and manipulation of vegetation to ameliorate or control floods and erosion, or to provide the maximum yield of usable water. He should be able to plan the coordination of one or more other uses for nonagricultural land with that of watershed protection. If there is competition in these fields, the greater is the forester's opportunity to demonstrate his ability.

The management of protection forest implies that the forester takes his place as manager of areas predominantly composed of nonagricultural land. He should be better qualified than those with other training to plan and carry out such management. However, within large areas of wild land in need of management as protection forest, frequently there will also be need for engineering works or for modifying agricultural practices on cultivated lands within the boundaries. Furthermore, there may be occasion for special study of geology or soils, or of the economic requirements of the surrounding territory. On such local areas, engineers, agronomists, geologists, soil scientists, or economists may be needed as specialists to supplement the work of the forest manager. Qualified by reason of his training and experience, the forester should take his place as the manager of wild land areas as a whole. At the same time, however, he should have an understanding of the place and value of engineering works, soil studies, strip cropping, and similar measures on areas where they are needed. The important thing is that engineering and all vegetative measures in erosion and flood problems be brought into proper balance.

The fundamentals of erosion, streamflow, and forest influences have only partially been worked out. Additional research on many phases is essential. Such research will inevitably involve the fields of plant physiology, biology, chemistry, and physics of climate, water, and soil. For research into the more fundamental aspects many foresters are not well prepared. In addition to the usual forestry training, such research requires advanced training in physics, engineering, soil science, plant physiology, or related sciences. One, two, or three years of graduate study in addition to the usual forestry course may be needed in preparation. The successful combination of more advanced study together with a broadening of the field involved in acquiring a usable facility in a related science is essential for effective research. At the same time, it

probably always requires superior inherent ability. If few foresters find it feasible to attempt to cover the wider field in a more fundamental way, there remains the alternative possibility of a coordinated attack by research specialists, each in his own field. In many situations, this may be the more fruitful course. It may be suggested, however, that these units composed of diverse specialists do not always develop the desirable coordination unaided. The forester may be an essential element in such a group to grease the skids and guide the progress.

To sum up, the qualifications of foresters should be adequate for those phases of watershed protection which involve ecology, seeding and planting, and forest management. With notable exceptions, forester are not well prepared for the engineering, soil, and agronomic phases or for research into the fundamentals. The forester is qualified and should take the lead on wild lands, or he may become the specialist for the uncultivated parts of areas which are predominantly agricultural.

The question of qualifications leads logically to the related one of educational training and preparation for work in watershed protection. The experience of those who have been so engaged points definitely to the value of the general four-year undergraduate training, including thorough grounding in the fundamental sciences and in silvics, seeding and planting, and management. If time permits the election of desirable courses in engineering, soil science, ecology, geology, or geography, so much the better. It is the opinion of your Committee, however, that these nonforestry subjects, which are unquestionably valuable for the forester responsible for watershed protection, usually cannot be undertaken adequately during undergraduate years without sacrificing other essential preparation. The obvious corollary is that one or more graduate years devoted largely to the related fields is likely to increase measurably the effectiveness of the individual, and indirectly to reflect credit on the profession.

One more thought may be suggested. The necessity of cooperation and coordination, previously mentioned, as between individuals with different backgrounds working on the same problem, is hardly less important in the case of groups or organizations similarly engaged. At the present time several large independent units of the government are attacking the problems of watershed protection. The field is large enough to accommodate all, and doubtless consideration is being given to coordination between them, whether on a geographic, biological, sociological, or other basis. We may confidently expect that foresters in those organizations will take leading parts in avoiding duplication of effort and in promoting frequent exchanges of ideas and plans, with a view to the development of the most productive general plan of attack.

The report may be summarized in a series of recommendations:

(1) That the Committee be authorized to broaden the scope of its activities to include all phases of watershed protection on wild lands, and that its designation be changed accordingly to Committee on Watershed Protection.

(2) That foresters engaged with other professional workers in this field recognize the competitive nature of the situation and the importance of demonstrating their competence.

(3) That foresters as managers of wild lands realize the need and value of other technical practices to supplement forestry techniques.

(4) That preparation for watershed protection should include, as an essential foundation, a general four-year forestry course.

(5) That research in this field requires one or more graduate years of specialized training.

(6) That foresters in organizations concerned with watershed protection promote actively coordination and cooperation to avoid conflicts and to arrive at solutions most effectively.

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Annual Chairman.

DISCUSSION

Mr. John C. Kuhns: I believe what we have just heard is pertinent not only for foresters but also for lumbermen and forest-land owners. The public is paying more attention to the value of the forest for other purposes than to its value for timber products. Increased demands are being made on our supplies of water, both for municipal use and irrigation and for power. There is also the attention which is being paid to disastrous floods. Cowan has spoken of the need to devote more attention to young growth, chiefly from the fire protection angle. In the Northwest it has been customary to call reproduction brush, and we have oftentimes heard it told that a fire burned several thousand acres but was stopped before it did any damage. It should be better realized that damage to the young growth impairs the water supply. A Boise experiment station article brought out that trees 15 feet or 20 feet in height probably afford the best watershed protective cover, because there is less loss through transpiration than from larger trees. As for the need of maintaining timber along our highways, I think we should stress the fact that young growth affords the same forest influences as virgin timber, and is less subject to disastrous wind-throw. We could also point out that a young forest can be more easily manipulated through silvicultural methods than the virgin stand. These things should be taken into consideration in trying to win public support for the practice of forestry here in the Pacific Northwest. Too much attention has been devoted merely to the value of the tree product in the terms of pulpwood, veneer logs, or lumber. We can get better public support for our forest industries—and I think they need it—if we emphasize the fact that in growing and harvesting the forest crop we are manipulating the forest in such a way that it is also beneficial in other respects.

The meeting then adjourned.

WEDNESDAY MORNING SESSION, DECEMBER 16, 1936

SUBJECT: NON-COMMODITY FOREST LAND USE AND MANAGEMENT

Chairman: HENRY S. GRAVES

Chairman Graves: In the very early days of the development of forestry in the United States non-commodity forest-land use was not overlooked, but we had no real conception of the importance of the various services of the forest comprehended in this term. The laws which established the National Forest system emphasized watershed protection and timber production. However, a good deal of the public support which made the system possible came from those who were primarily interested in recreational aspects of forestry. Fortunately, those who drew the 1897 legislation authorizing the administration of the forest reserves provided very broad authority for varied uses, even though the economic and social problems of the future could not then be foreseen, with all the complexities they have introduced into our undertaking. We are now to discuss some of them.

The following papers were then presented.

FORESTS AND SOIL CONSERVATION[1]

BY W. C. LOWDERMILK

Associate Chief, U. S. Soil Conservation Service

THE Soil Conservation Act of 1935 (Public No. 46, 74th Congress) was the culmination of 250 years of American experience with soil erosion and its consequences. Soon after the colonists had cleared away forest cover for their corn patches and for their money crop of tobacco, they recognized the wasting effects of soil wash; and they undertook in divers ways to control erosion. This movement, however, was laid aside when the opening of virgin lands to the west, fostered by breaking the resistance of Indian tribes and by mechanical transportation, enticed farmers from their gullied hillsides of the Atlantic slope. In time the exploitation of prairies and plains of the central west and the great plains raised similar problems of soil wash, and new problems of wind erosion. Escape from eroding fields, as well as land hunger, drove agricultural pioneers to irrigation and to the fringes of the desert. Finally the frontiers of new lands had disappeared; the land was occupied; there is now no escape to new lands; the era of land occupation has come to an end. The menace of soil erosion to sustained productivity of the land and to investments of money and of human lives in our lands has brought the American people face to face with the problem of conserving its soils, and therewith, its waters. The response to this problem on the part of an informed citizenry and its representatives was primarily responsible for the enactment of the Soil Conservation Act.

This Act initiates a new era in the relationship of the people of the United

[1] Paper presented for the author by H. E. Holman.

States to their land; it is the official statement of a national policy which has been long in finding a full and articulate expression; it sets forth as a policy of the federal government a recognition of the manifold menace inherent in soil erosion, as well as objectives for soil and water conservation and the means of obtaining those objectives. The significance of this Act is beyond measuring at present; it is far-reaching in its intent and scope, and fundamental to the sustenance of our civilization.

The many long and devious roads which converged in the formation of this national policy cannot be retraveled in retrospect within the limits of this paper. Movements toward the objectives were begun at different times; some as early as 1685; some lost their way, others were delayed. Moreover, a great impetus to the movement was given at the beginning of this century by quantitative measurements of losses of soil and reduced effectiveness of rainfall from immediate superficial runoff. These measured results attracted wide attention to soil wastage. A new conception of soil depletion arose; soil wastage might occur from soil erosion as well as by leaching and by the removal of plant nutrients in harvested crops. Measured quantities of eroded soil produced the realization that topsoils were being washed off lands in less than a generation, and that measured superficial runoff lessens the effectiveness of beneficent rain and increases the destructiveness of storm waters.

Some phases of the movement which gave rise to the formulation and passage of the Soil Conservation Act may be examined with profit. These elements were at first haphazard; but they were guided inevitably by the growing demands on agricultural production, as intensified by the world war and the post-war period.

As early as 1685 the first William Byrd of Virginia described a deluge of rain which carried away tobacco hills as well as the top of manured land. The preliminary experiments of Washington on his Mount Vernon estate, as well as those of Jefferson and Thomas Mann Randolph elsewhere, indicate that the colonial planters had developed a lively concern for the wastage of soil by washing. The control of gullying was attempted. Patrick Henry is recorded to have said:

"Since the achievement of independence, he is the greatest patriot who stops most gullies." The proceedings of the agricultural societies of the early days of the Republic contain repeated references to the problem of soil washing in several connections.

Efforts at the control of erosion passed through an interesting evolution; they included contour plowing as early used and recommended by Jefferson, filling of gullies with brush and manure, hillside ditching, and finally the broad-base terrace. The use of the side-hill ditch, and its improved form, the broad-base terrace, had spread through the cotton-farming belt by 1900. It was the most effective measure in preventing the gullying of fields that had been developed up to the latter part of the past century.

The single measure of terracing failed, nevertheless, as a solution of the erosion problem; it only retarded the development of gullies; it did not control erosion. The extensive areas of abandoned terraced farm fields in the South are mute evidence to the failure of this single measure as a solution of soil conservation. When erosion was not controlled successfully by these means, as was generally the case, the eroded fields were abandoned to pasture, or to volunteer growths of pine.

The experience with the much heralded and widely used broad-base terrace emphasizes the difficulty of solving a complex problem with a single remedy. The failure of the farm terrace as used in early American agriculture led to the at-

tack upon the complex phenomena of soil erosion with a coordination of several measures and practices in accordance with the needs and adaptabilities of the land.

Since a more adequate appreciation of the complex character of soil erosion and the needs for a suitable attack for its control was developed through investigations by state and federal research agencies, special attention is properly given to a summary review of erosion investigations. Early workers in erosion research cooperated in their studies and developed information rapidly. The significance of such studies caught the attention of many students of land problems.

The first formal investigations were conducted by Paul Kifauer at the State A. and M. College of Tennessee. The results of these studies were published first in 1890. Newman in South Carolina between 1893 and 1905 developed terracing and contour cultivation. Griffith and Forbes in Arizona experimented with the spreading of water and revegetation under arid conditions in the Southwest. The Mississippi state legislature in 1904 appropriated $3,000 for soil erosion investigations. Plot experimentation by Duley and Miller, begun in Missouri in 1916, yielded measurements of astonishing soil and runoff losses from cultivated lands. Studies were begun in Illinois in 1906-07, but the results were not published until 1935. Such were the most important efforts of state investigators in the field of soil erosion.

The Congress of Governors convened on May 13, 1908, by President Theodore Roosevelt to consider the question of the conservation and use of the great fundamental sources of wealth of the Nation gave far-reaching impetus to the movement for conservation of natural resources. The proceedings of the Congress contained deliberations of some of the ablest thinkers of the century. The movement for the conservation of forests and waters was advanced rapidly as an outcome of this Congress, and it may be said that the passage of the Soil Conservation Act was made possible more readily or at an earlier date than otherwise might have happened.

The Department of Agriculture of the federal government had some years previously taken notice of soil erosion as a factor in agriculture to be reckoned with. In 1866 the Agricultural Yearbook contained a reference to erosion in Georgia. In 1894 the Department Bulletin 20, entitled "Washed Soils, How to Prevent and Reclaim Them", was published. In 1895 B. E. Fernow prepared an article on erosion for the Agricultural Yearbook. The Soil Survey was established in 1899, and W J McGee, in 1911, published "Soil Erosion" as a bulletin of the Bureau of Soils. By 1905 H. H. Bennett and McLendon, then of the Soil Survey, made references to the erosion of soil in Soil Survey reports of Louisa County, Virginia. In 1921 Bennett presented before the Third Southern Forestry Congress a detailed analysis of the effects of erosion and its relation to land use. This report is one of the most significant documents in the history of erosion literature. The survey covered 123 counties in Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas, involving 36 million acres of land, 93 soil types, and 13 major regions. This was the first attempt in America to consider the erosion problem on a regional basis.

Members of the U. S. Geological Survey early gave attention to soil erosion. N. S. Shaler recognized that the clearing of forest land and its cultivation exposed it to increased erosion, and increased the superficial runoff as evidenced by a large increase in drainage channels. Glenn described in a professional paper of the Geological Survey, "Denudation and Erosion in the Southern Appalachians", the changes in landscape brought about by

cultural practices. McGee in his U. S. Geological Survey monograph on the Lafayette formation distinguished between "old erosion", or the normal geologic erosion, and the "modern erosion" arising from cultivation of sloping lands.

This distinction, however, has not been maintained in the writings of some recent commentators. They have used the term erosion to apply indiscriminately to the geologic norm of erosion and to soil erosion. But while both normal and soil erosion are geologic in nature, soil erosion refers to accelerated and induced phases of normal erosion or to eroding processes different in character from normal erosion. This necessary distinction is more readily understood in the light of the following significant fact. A geologic norm of erosion for a particular area is responsible for sculpturing a landscape, but it generally does not proceed at a rate in excess of soil formation. Under the protection of natural mantles of vegetation, the normal rate of erosion allows time for the processes of soil formation to develop soil profiles. Other factors being equal, the degree of maturity of residual soil profiles is a rough rate index of the geologic norm of erosion on sloping lands. On the other hand, soil erosion or accelerated erosion refers to the process induced by cultivation or other clearing or depletion of the natural mantle of vegetation. This accentuated or induced phase of erosion, namely, soil erosion, proceeds almost universally at a rate in excess of soil formation; it means soil destruction in comparatively short periods of time, often in less than a generation unless a change in use of the land comes about.

Investigations by the federal government of erosion-control methods were undertaken by several bureaus within the present century. Probably the first was undertaken in 1902 by the Division of Irrigation and Drainage, then of the Office of Experiment Stations, later to become the Bureau of Agricultural Engineering. One of the early concerns of the Bureau of Forestry, which became the present Forest Service, was erosion in relation to forest fires in Southern California. The classic Wagon Wheel Gap experiment was initiated in 1908 to determine the influence of forest cutting on streamflow and erosion. In the same year the Ephraim Range Study in Utah was begun to determine the influence of grazing on streamflow and erosion. The field examinations called for by the Weeks Law of 1911 further led to studies by the U. S. Geological Survey in cooperation with the Forest Service on the relation of forest cover to runoff and erosion. The establishment of the California Forest Experiment Station of the Forest Service in 1926, and the subsequent studies of the writer, showed that forest litter is far more important in maintaining a soil at its maximum rate of water intake than in acting as a so-called sponge. The Bureau of Plant Industry published, in 1912, Circular 94, "The Mangum Terrace in its Relation to Efficient Farm Management". There followed a careful and extensive field study of terracing by the Division of Drainage Investigations, resulting in the publication of Department Bulletin 512, "Prevention of the Erosion of Farm Lands by Terracing". The widespread interest in this bulletin led to further studies and the publication by Ramser of Bulletin 997, "Terracing Farm Lands and Gullies, How to Control and Reclaim Them." Government bureaus in different ways contribute to the general movement toward a national policy in soil and water conservation.

Cooperative effort in erosion investigations began a period of concerted effort on the part of states, chiefly North Carolina, Oklahoma, and Texas, and the federal government. This cooperation resulted in the formulation of a national

program of erosion investigations in 1929. The agricultural appropriation act of the fiscal year 1930 carried an item of $9,485 for erosion investigations in the Bureau of Chemistry and Soils. The erosion reconnaissance financed by this appropriation was presented in the hearings before the house committee on appropriations of the Seventieth Congress in November, 1929. The Buchanan amendment to the agricultural bill for 1930 provided an appropriation of $160,000 for the establishment of 10 erosion experiment stations. This was the first congressional recognition of soil erosion as a national problem. This appropriation financed the initial program of research, with definite objectives but with divided leadership.

The fund of $160,000 was divided between three bureaus, namely, Chemistry and Soils, Agricultural Engineering, and the Forest Service. The Erosion Experiment Stations, established jointly by the Bureaus of Chemistry and Soils and Agricultural Engineering, received the major portion of the fund. The experimental studies made at the erosion experiment stations yielded astounding results, indicating the amount of soil eroded from clean tilled crop lands as compared with plots in grass and forest cover. Likewise the immediate loss of rain water as superficial runoff explained how ineffective rain may become as a source of soil moisture and how flood flows may be augmented from eroding lands.

These Erosion Experiment Stations began to build up a body of information in quantitative terms which furnished the basis for making known the seriousness of the menace of soil erosion. Such factual data furthermore gave to the workers in soil erosion a conviction and a position of authority in matters of erosion which brought about convincing presentations of the problems of soil erosion and the need for control measures.

Thus through a period of 250 years there had developed a cumulative support for soil-erosion prevention and its control. The ground was prepared, when the emergency measures of 1933 were initiated. Accordingly, the Soil Erosion Service was established within the Department of the Interior and financed from an allotment of Public Works Funds carried in the National Industrial Recovery Act.

Bennett's leadership in soil-erosion matters was recognized by his appointment as Director of the new organization, the Soil Erosion Service. His master stroke in formulating the program of the Service was to adopt the coordinated attack in planning and carrying out measures of erosion control. This policy provided for bringing to bear all necessary specialties upon the problems within a single field or tract of land so as to reach a composite solution to a complex problem. In short, the approach was made not from the viewpoint of any single specialized field of inquiry, such as soils, agronomy, engineering, or forestry, but rather from the viewpoint of the needs and adaptabilities of the land. Freedom was maintained to call into use all specialized fields of learning or practice to effect erosion control on a single field, on farm and pasture lands, and on watershed areas.

This coordinated attack eliminated the shortcomings of past effort in erosion control on agricultural lands; it was not limited to a single method of attack, such as terracing; it provided for the recognition of the place of any and all measures, each with due consideration for the supporting and supplementary effect of other measures. And later, in 1935, when the Soil Conservation Act was passed by Congress, the tested features of the coordinated attack in erosion prevention and control were embodied in its provisions, and the Secretary of Agriculture was empowered to coordinate all soil-erosion work of the government.

The coordinated approach to the pre-

vention and control of erosion, and therewith the conservation of soil and water, as authorized by the Soil Conservation Act, gives primary consideration to the basic resource, the soil. Soil crops and methods of crop production are considered in the light of their effects upon the maintenance of the integrity of the soil resource. Once this requirement is met, a liberty of action is assured in which crop production in kind and amount may respond to prevailing demands. The first essential in soil and water conservation, moreover, is the maintenance of the integrity of the soil resource.

Forest cover thus is given a consideration apart from its yield of wood products. The forest becomes a cover crop, a soil-saving crop. The forest has always contributed to soil formation and has preserved the resulting soils over large areas ready to agricultural use. In turn the forest within appropriate climatic regions becomes also the great healer of worn-out or erosion-damaged lands. The forest restores soils; it renews the natural balances of erosion, soil formation, and streamflow.

In a similar way, the native grass cover is a cover crop, a soil-conserving crop. Likewise, grass cover has played an essential role in soil formation of the prairies and the plains, and under many conditions furnishes more prompt erosion control than the forest. And in a special sense, the selected forage crops, such as alfalfa and pasture grasses, are used as cover crops in rotations and in permanent pastures to supplement measures of soil management to prevent and control erosion.

Thus grass cover and forest cover are perennial crops when conservatively managed, and conserve soils and regulate the regimen of run-off waters as well. Forests are not necessarily permanent crops, except in rugged topography or in climatic zones unsuited to cultivated crops. Forest lands may be converted into farm fields; the same is true of native grass lands under favorable conditions for crop production. Forest cover may thus become, under favorable circumstances, part of a prolonged rotation of timber and field crops.

The protection forest comes to have an additional function; it may also serve to keep soils in storage for later agricultural crop production. Conversion of forested lands to such uses, however, should properly await such demands as would justify methods of soil management that will safeguard the integrity of the soil resource.

The forest areas lying in the more rugged mountain areas and at the unfavorable climatic altitudes will not fall within the possibility of potential cropland use; such areas will always be reserved exclusively for timber production, for watershed protection, for recreation, for wildlife management and closely related activities. Ordinarily these objectives will coincide with those of soil conservation and possibly regulation of streamflow. In a similar way, practically level lands, such as alluvial plains, under favorable climatic conditions will usually be devoted exclusively to cultivated crops. Level acreage, obviously suited to continuous cropping because of low erosion hazards, is small, however, in comparison to the crop-land needs of the Nation. There lies, therefore, a vast area between the permanent forest and grass land and the plow land of minimum erosion hazard. Throughout this area a variety of rotations and optional uses may prevail from time to time, requiring specific measures to assure permanent agriculture. The primary consideration then would be the adjustments of measures, practices, and cover crops to fit the dual requirements for conserving the soil and for the needs of a dependent people.

The problem as stated here for this

vast intermediate area is less easily comprehended than for a single farm of plowed fields, permanent pasture, and woodlot. All these tracts make up the farm unit and must be included in the farm management plan. In the coordinated attack upon erosion affecting a farmstead, there is called into service the soils man, the agronomist, the pasture and grazing specialist, and the forester and the wildlife management specialists as well. The solution of the problem on the farm may thus serve as a prototype for large areas which may be under consideration.

Accordingly, a program as called for under the Soil Conservation Act has need of a goodly staff of foresters to meet the needs of incorporating woodland management into the farm management plan for soil and water conservation. It offers employment to foresters and gives them an opportunity to work out ways to manipulate the woodlands within farming areas in the best interests of soil and water conservation.

To furnish the basis for adapting the use of land in the interests of flood control, silt control, and ground water conservation, the Soil Conservation Service, as a part of its research program, is carrying out investigations into agricultural influences, namely, the influences of various types of land use on the hydrology of ground water, stream flow, silt and flood control. These studies on agricultural areas are complementary to the Forest Service investigations in forest influences on predominantly forest lands. These studies are complementary, not duplicating. Together they will provide a body of information on which land-use practices will need to be patterned to assure the optimum use of soil and water resources for the country as a whole.

The Soil Conservation Act can thus be heralded as one of the most constructive pieces of legislation affecting the conservation of natural renewable resources. It is the outgrowth of a long experience of the American people with soil wastage and water damage. It has properly made the soil the center of consideration, and makes possible the coordination of any and all specialties to achieve the fundamental objective. It recognizes that the nature of crop is less important than the adequate safeguarding of the soil from wastage and loss. In other words, any apparent profit derived from a crop which causes serious soil loss is fictitious in national economy; it is progressive depletion of the Nation's capital; it is, in short, suicidal agriculture. Improved pastures, native pasture lands, and forest cover or woodland cover yield crops which are usually smaller in value than is obtained from clean tilled crops, yet they assure permanent returns, and at the same time provide for the primary need of soil and water conservation.

FORESTRY IN SOIL CONSERVATION; THE FORESTERS' NEW OPPORTUNITY

By JOHN F. PRESTON

Soil Conservation Service

The theme of this paper is that the soil conservation movement must have forestry as its chief ally. Forestry must replace other forms of land use on the steep and critically eroded land of the United States.

THE American people have become aware of the danger of the loss of our agricultural land through soil erosion, and they are trying to do something about it. Federal and state governments are becoming more and more active in erosion control.

The Soil Conservation Service was organized in 1935 on a permanent basis, and charged with the responsibility of doing something about the Nation's erosion problem. This Service has the cooperation of other bureaus in the Department of Agriculture in working for conservation of the soil. In various places, counties and local associations of farmers have equipped themselves with terracing machinery and are earnestly trying to save the fields from the results of rushing waters. In the Tennessee Valley, the T.V.A. is also attempting to stop soil erosion, as well as building dams for power and navigation. All of these activities represent more or less piecemeal attacks on the problem and are somewhat lacking in coordination, but the movement is gathering momentum. In all the hurly-burly of soil conservation, forests stand out as the best crop under which the soil is not only stabilized but built up in quantity and in fertility. Foresters have a new opportunity to make their voices heard in the land.

Generally, the people do not yet appreciate the seriousness of the land situation, and the doctors do not yet realize the magnitude of the job ahead. The following, which is taken from the report of the National Resources Committee dated June 15, 1936, and which gives a word picture of the land situation in the United States, is well worth quoting:

"The fact is that most of the territory occupied by the United States is not naturally suited for a permanent civilization. It is like the land of the Mayas of Yucatan or the land of Babylon—a rich country where civilization can flash into a blaze of glory and then collapse in a few generations into ruin. Our soil is not enriched by the usual methods of cultivation, but impoverished. By the normal processes of our farming, our mining, and our lumbering we create a desert. Americans need to realize that all other national hopes and aspirations are secondary to the question whether we can continue to eat. Without a fertile soil and self-renewing forests, the splendor of our bankrupt cities will become a ghastly joke. Armies and navies cannot defend a nation against the scourge of wind and flood; constitutions and courts have no authority over natural law. Any nation whose land naturally tends to turn into desert must either take measures to preserve the land or it will surely die."

The extent to which forestry is employed in the conservation of farm lands is indicated by the work of the Soil Conservation Service in farm woodlands. Up to June 30, 1936, statistics indicate that this organization had worked on 33,450 farms covering a total of 5,375,119 acres. On these farms, the land retired from cultivation and planted to trees

and shrubs increased the percentage of woodland from 10 to 15 per cent of the gross area, an increase of 250,000 acres. The gross area of these farms, according to the 1935 census, represents approximately ½ of 1 per cent of the total area of farms in the United States. If the farms in cooperation with the Soil Conservation Service are representative of farms in the United States, and this seems to be a reasonable assumption, then the farm woodland could eventually be increased by at least 50 million acres if the soil conservation land-use plan were adopted on all farms. This would give us a total figure for farm woodlands of 235 million acres. Intensive forestry can and should be practiced in farm woodlands.

Quoting Mr. Mattoon of the Forest Service, "It (farm woodland) is the best forest land on the average, because the farms are located in the regions of the best soils. Their productive capacity, therefore, probably averages highest of any class of timber land in the country."

Mr. Mattoon's statement is true of much of the natural forest land included in farm woodlands, and in time the planted forests will restore to productivity the lands returned from crop farming to forestry. The management of this vast area of farm woodlands is a task which challenges the ability of the forestry profession.

For the past 40 years foresters have been talking farm forestry, trying to get the farmers to take advantage of the opportunity to practice forestry on lands highly productive and close to markets, and under conditions which permit intensive forestry practice seldom encountered anywhere else in the field of forestry in the United States. But in spite of these favorable conditions and in spite of the good work which has been done by the Extension Service and by other organizations, progress seems discouragingly slow. No doubt the explanation is that farmers have not yet appreciated the value of the forest as a producing unit of the farm.

Farmers have traditionally considered the forested part of their farms as waste land. The revenue from the sale of forest products and the value of the products used on the farm have been taken more or less as a matter of accident. The farmer has seemed to consider that which he gets out of his woods as largely velvet, and has not appreciated the fact that he is harvesting a crop which can with reasonable care be harvested again and again. Since the value of the woodland has not been appreciated, woods fires have continued, and sheep, goats, and cattle have been allowed to graze through the woods. The farm woods are producing only a small part of what they could produce if we could but get the farmers to understand the simple principles of woods culture.

Perhaps one trouble has been that foresters have worked as specialists. They have been one-crop men, and that crop covers a very long growing period. To the farmer, growing timber has seemed to be a business entirely apart from that of growing corn, cotton, wheat, hogs, or cattle. There have been other obstacles to farm forestry, of course, such as the tenant system and the difficulties of marketing small quantities of material, and especially small quantities of the low-grade material most often produced in the farm woods.

The soil conservation movement has brought about a new opportunity for foresters. Again quoting Mr. Mattoon of the Forest Service:

"The present nation-wide consciousness of better land use and conservation of soil and other resources should mean a decided change for the better in the handling and production of the forest land on farms. Such a change should mean a very considerable increase in the income from

farm forest products, from the present average rate of 75 cents an acre to at least three or four times that amount. As a crop, timber ranks relatively high in respect to net income. Proper handling of the farm woods will mean much in an integrated farm program and as a stabilizing factor in the farm budget."

The interest in soil conservation has brought forestry to the front, because properly managed forests are an exact antithesis of soil erosion. The work of the Soil Conservation Service in its present stage of demonstrating to farmers the proper way to farm without losing the soil through erosion, and still make a living out of the land, is giving foresters a new vantage point for attack as well as a more direct responsibility for making farm forestry contribute its part to the revenue-producing ability of each farm unit.

The Soil Conservation Service has a coordinated approach to the soil erosion problem. It draws together all of the specialists in agriculture: engineers, biologists, agronomists, agricultural economists, soils men, and foresters; and together they prepare a new plan of land use adapted to the peculiar conditions of the farmer and of his land. The direct result of this new land-use program is to focus attention on the farm woodland as an integral part of the producing area of the farm. The acreage of the woodland tends to increase, because in order to stop erosion steep and eroded land must be reforested. The income of the farmer is very sensitive to changes in land use. The new program therefore focuses attention on woodland management in order to justify the substitution of forests for more unstable land-use practices.

The philosophy which the Soil Conservation Service is attempting to bring to the farmer is that there is no waste land, that any part of the farm which cannot or should not produce annual vegetative crops can produce revenue in some other form, either as trees, as wildlife, as recreation, or as an aesthetic setting which will have its reaction in the increased value to the farm. In the scheme of the Soil Conservation Service the forester is a member of the clinic which prescribes for ills which beset the farmer. His prescription is fire protection for field and woods, fences to keep grazing animals out of the woods, and the reforestation of steep and eroded lands. In making up this prescription, he has the help of other agricultural specialists. For example, if the agronomist provides better pasture on half the acreage formerly used, the steep part of the old pasture is released for reforestation; if the engineer concentrates water by diversion ditches, it is possible to grow trees in parts of the United States where that was not possible before. The forester knows from his intimate contact with the farmer, and because he has helped to make the new farm plan, what forest products are needed. He plans his silviculture and his rotation accordingly.

The forester is no longer just another specialist working from the outside; he works from the vantage point of the inside council. Farm woodland management, through its association with other land-use management plans, attains a significance and effectiveness never realized where the forester lacks the advantage gained by cooperation with other specialists in agriculture. He is in a position to do much more than educate the farmer. With the owner's cooperation and active assistance, the farm woodland is actually put under management. The farmer has acquired the services of a consulting forester.

The forestry problems as encountered by the Soil Conservation Service are almost as varied as are the different forest types and sites of the United States. The outstanding problem is to get some sort of cover on the "sore spots". The badly

eroded fields and gullies, where all the topsoil is gone, present a particular problem. Here any sort of vegetation which will grow is planted as a nurse crop. For such places the ubiquitous black locust has proved a friend indeed; next in importance are the hard pines and some of the shrubs which are often the only soil-protecting plants which can be artificially established. In many other situations, however, erosion has not so completely removed the topsoil but that it is still possible to get trees representing more nearly the climax type for the region to thrive.

For example, in the Northeast there is some opportunity to grow spruce, and wherever this opportunity exists, plans are being made to grow the spruce in our nurseries and plant them on the farms in cooperation with the farm owners. Spruce on suitable sites in the Northeast can be profitably grown because of its high value for pulpwood and the fact that here is located a great paper industry largely dependent on this species. Therefore we can at the same time help the farmer who wants to grow something for market and the industry dependent upon the forest for its raw material. Here also the sugar maple reaches its best development, and maple-sugar orchards are common. They have, however, been sadly neglected by overgrazing; and all foresters in this territory have an opportunity to be a real friend to the farmer by showing him how to develop this most valuable ally—the maple-sugar orchard.

In the Great Plains, where the dust storms originated, forestry is making progress chiefly in the planting of shelterbelts and windbreaks, and in more extensive planting in places where sufficient moisture can be concentrated to justify it. In this region shelterbelts alone are obviously not sufficient for the control of erosion and the conservation of moisture. They must be aided on crop lands by cultural methods which give the wind little chance to pick up the dirt. They must be supplemented by cover crops, strip crops, by furrowing, or by permanent grass cover.

Over one-half million acres of farmers' woods have been put under management by the Soil Conservation Service, or, if newly planted areas are included, over three-fourths of a million acres. The farms included in the demonstration areas are scattered throughout the United States and their distribution gives them an importance as demonstrations far beyond what the relative acreage might imply.

In the broader field of forest lands outside of farms, the forester's opportunity and its relation to soil conservation is well shown by the conservation program on the Navajo Indian Reservation in Arizona and New Mexico. A land rehabilitation scheme is being undertaken by the Soil Conservation Service and the Indian Service, which have combined their resources into an organization known as the Navajo Service. Here is a striking example of a civilization dependent on the soil which, through misuse of its fields, range, and timber, is gradually but surely creating an uninhabitable desert out of a land of sufficient natural resources to support a people equal to or greater in number than the present population. The signs of land misuse are, as usual, soil erosion and floods—those twin despoilers of many a fair country. Too much grazing, too much trampling by stock, and overcutting of timber are the causes, brought about by rugged individualism carried to the extreme—by laissez faire run riot.

The Navajo Reservation is a land of desert range, pinon-juniper range, and in the mountains a forest range—the western yellow pine type, commercially exploitable for lumber. The Navajo Indians are a nomadic people getting a livelihood from grazing sheep, goats, cattle, and

horses, and by growing corn in small patches of subirrigated lands. Fuel, fence posts, poles, and hogan timbers come mostly from the pinon-juniper type. Overcutting in this type removes the forest cover, and grazing prevents reproduction of the trees. Likewise, overuse reduces the grass to a point where the soil is slipping away, leaving eroded slopes and great gullies—deserts more desolate and forbidding than Sahara.

The Navajo Service has undertaken to stop the destruction and bring about a balance between use and the reproductive powers of nature. Soil conservation is another name for land use apportioned in accordance with the ability of the land to maintain stability of production. Under present conditions, nature cannot reproduce grass or timber, and biologically that means death; death of the power of the land to reproduce means death to the dependent civilization. This is a public responsibility, because there is no other place for the Navajo Indians to go. The cure is a change in land-use practices, the details of which are incorporated into an integrated land-use plan. The making of such a plan calls for the services of biologists, engineers, soil scientists, economists, and even sociologists, as well as range men and foresters.

It is absolutely necessary to regulate the cutting of timber for domestic purposes in the pinon-juniper type, and to regulate the grazing throughout the reservation. Other measures of rehabilitation include the storing of water for the development of larger areas of agricultural land, and the spreading of water on the range to improve the grass. The grazing situation demands a reduction in the number and changes in the method of handling stock. These changes must be balanced by greater production of agricultural crops for home use and by sustained-yield production of logs and lumber from the extensive stands of yellow pine timber in the mountains. Reduction of grazing will allow the yellow pine trees to reproduce, and this in turn will make possible the cutting of the mature timber to meet the needs of the Indians for additional means of livelihood as a result of stock reduction. It is possible to substitute money received from timber sales, and labor in logging and milling and transportation, for revenue formerly received from the sale of wool and meat.

Forestry and the necessity for it comes to the front in this new régime—both the more simple selection in pinon-juniper type and the more complicated silviculture and management in the high forest represented by the yellow pine. It would be difficult if not impossible to solve the problem on the Navajo without forestry.

Here it is plain that the old system of rugged individualism has failed completely. Nature can stand use, but not misuse. It is more and more evident that regulation of the use of natural resources is needed if soil erosion is to be stopped and nature brought into a balance enabling it to support the demands of the people who are dependent upon the soil. Herein lies another opportunity and another responsibility for foresters.

HOW MUCH AND WHAT KIND OF FOREST LAND SHOULD BE DEVOTED EXCLUSIVELY TO RECREATION AND AESTHETICS?

By JOHN D. COFFMAN
National Park Service

SOCIAL conditions during recent years have undergone such marked changes and still are in such a condition of flux that it is more than hazardous to predict just how much forest land will ultimately be required for recreational use.

Such factors as mass production of automobiles, accompanied by the development and expansion of the national highway system, shortened hours of work and more days of leisure for the working man, together with considerable unemployment, have greatly facilitated and increased the use of recreational areas, both those near centers of population and those at a distance, and have created a demand for more.

In 1929 the area of National Parks and Monuments amounted to 10,142,080 acres, and the number of visitors recorded was 3,248,264. For the travel year ending September 30, 1936, the number of visitors to the National Parks and Monuments was reported as 9,929,432, an increase of 205 per cent in seven years, while the area involved had increased to 15,491,672 acres, an increase of 52.7 per cent. This increase does include large travel to many of the military and historic shrines near large centers of population in the East, which were added to the National Park System by Executive Order in 1933, but the travel to the western National Parks also increased very markedly.

In a similar seven-year period the actual recreational use of the National Forests mounted from 6,550,317 to 11,891,494, an increase of 81.5 per cent, while during the same period the area had increased from 159,750,520 acres to 165,978,691 acres, an increase of only 3.9 per cent.

Perhaps none of these travel figures are entirely accurate, but having been taken from year to year in accordance with the same practice, they are at least indicative of the greatly increased use of the National Parks and National Forests by the public.

This increase in recreational use has been particularly marked during the past three years, and has affected not only National Parks and Monuments and National Forests but metropolitan, county, and state parks as well. Under the impetus of the Emergency Conservation Work program the state park system and related recreational areas (monuments, recreational areas, waysides, and parkways) have grown from 3,259,996 acres to 3,859,087 acres, an increase of 18 per cent in three years. It is estimated that eventually these state recreational systems should include not less than 6,665,000 acres.

In addition to the foregoing types of recreational areas, the recreational demonstration projects which have been developed under the emergency program of the past three years indicate still another extension and expansion of recreational facilities for the public. These areas are being developed to fit in with the recreational and welfare programs of large centers of population. To date 46 such projects have been established, involving the eventual purchase of 412,670 acres. These projects are divided among 24 states.

It is difficult to foretell just how extensive will be this expansion of the recreational field under the intensely social and humanitarian program of the Roosevelt

administration. The last congress authorized a survey to be made to determine present use and future needs for recreational areas. Already numerous recreational areas are so intensively used that they have lost their charm and attraction for many people who demand additional and less crowded conditions for their picnicking and camping. I have even heard the suggestion made that a limit be placed upon the number of people who shall be admitted to some of the National Parks, as for instance into Yosemite Valley, in order to prevent overcrowding and damage to natural conditions. Even now the length of camping privileges must be restricted in the National Parks, and this is true also of some of the most intensively used prepared campgrounds in National Forests and State Forests and Parks.

In connection with this camping problem, recreational administrators are now confronted with the question as to the probable extent to which the use of trailers will develop. Will a considerable portion of our population become nomads, housed in trailers, and to what extent will this require increased campground facilities? If the interest displayed in trailer exhibits at current auto shows is any index, we shall probably see many more of these houses on wheels on the highways and in our Forest and Park camping grounds in the next few years.

Until more accurate figures and estimates are available as a result of the recreational survey now in progress, let us consider the ideas advanced in the Copeland Report and in the subsequent report of the Forest Service to the National Resources Board as to the amount of land which should be devoted to recreational use. In the Copeland Report, Marshall[1] has estimated that approximately 45,000,000 acres will be required primarily for recreational use and that such an acreage would represent approximately 9 per cent of the total of 506,000,000 acres of commercial timberland in the United States.

The report of the Forest Service to the National Resources Board[2] shows 21,028,243 acres now in use for parks, recreation, wildlife refuges, and shooting grounds, and a total of 41,608,671 acres recommended for ultimate use for parks, natural areas, and recreation, plus 15,589,792 acres recommended for use as wildlife refuges and shooting grounds, which, if included under recreation, gives a grand total of 57,198,463 acres for recreational areas. It is my understanding that these figures are based upon reports covering approximately 83 per cent of the timbered area of the United States.

The Forest Service figures, I believe, do not show how much of the total acreage estimated for recreational use is forested and what proportion would be classified as nonforested lands. In the National Parks and Monuments something less than 50 per cent of the total area is forested, according to the best figures now available.

Including wildlife refuges and shooting grounds under the general designation of recreational areas, I will venture the prophecy that 70,000,000 acres within the United States will ultimately be dedicated to recreation and aesthetics. Of this total probably half, or 35,000,000 acres, will be forested lands. If this appears to be high, let it be compared with the total of 546,586,217 acres in all ownerships recommended in the Forest Service report as best suited for forest management, in comparison with which 35,000,000 acres would form only 6.4 per cent. Even in comparison with the 268,598,295 acres recommended for forest management un-

[1] A National Plan for American Forestry. Sen. Doc. No. 12, Seventy-third Congress, First Session, 1933, p. 487.

[2] Forest Land Resources, Requirements, Problems, and Policy: Part VIII of the Supplementary Report of the Land Planning Committee to the National Resources Board, p. 28.

der federal ownership alone, 35,000,000 acres is not excessive. In fact, these comparisons make me wonder whether an estimate of 35,000,000 acres of forested lands to be dedicated to recreation and aesthetics is not altogether too low!

With relation to the character of forest lands which should be devoted exclusively to recreation and aesthetics, I would say without hesitation that recreational needs will demand inclusion of practically all types of forest land within one or another system of recreational areas—federal, state, county, municipal, or private. In a large number of instances present dedication of forest land to exclusive recreational use has resulted from gradual development of such use of the area by the public and its demand finally for recognition of this use as the prime value of the area. Where use has not yet resulted in such dedication, but where wise planning indicates the greater value of such lands for recreational use than for any other purposes in future, land managers must be careful to preserve the recreational values of these areas against those uses or abuses which will impair their value for future recreation and aesthetics.

Naturally a great deal of the forested lands included within recreational areas will be of the protection forest type at the higher elevations, but the most magnificent stands of timber, which would be of high value commercially, should also be represented in the areas to be reserved exclusively for recreation and aesthetics. For example, redwood in the redwood State Parks of California; Douglas fir, Sitka spruce, western red cedar, and associated species in the rain forests of the Mount Olympus region; Douglas fir and associated species in Mount Rainier National Park; sugar pine and ponderosa pine in Yosemite and Sequoia National Parks; and valuable hardwood forests in Great Smoky Mountains National Park.

These reservations of forested lands illustrative of some of the most magnificent forests that man has ever known should not be mere roadside strips or fragments so small that future generations will be unable to visualize and appreciate the magnificence of the virgin forests with which Nature had endowed this great country. It was pressure of public opinion and demand for a representative stand of appreciable size of the best virgin sugar pine and ponderosa pine which resulted in the purchase from public and private funds of additional timberlands for inclusion in Yosemite National Park, and may yet result in further additions.

In the case of Parks, while recreation, inspiration, and aesthetics are most decidedly listed among the predominant purposes to which the areas have been dedicated, these are not their only objectives and uses. They are also of special value as wildlife preserves, and are so designated by Congress, and in addition they serve most admirably in watershed protection and regulation of streamflow. These functions are referred to as several separate uses in the Forest Service definition of the multiple-use conception for the National Forests, while they speak of the Parks as single use. This hardly seems consistent. It is true that the Parks are not used for the grazing of domestic stock, the commercial harvesting of timber, summer home sites, and certain other commercial or individual privileges which are permitted in the National Forests, but in addition to their use for recreation and aesthetics, watershed protection, and wildlife preserves, they also provide the finest outdoor laboratories for education and scientific research in geology and biological sciences. This, in fact, is one of their important functions, and in order that they may be suitable laboratories of Nature it is essential that they should be of a size that will consti-

tute a complete biotic unit. This factor is very often overlooked by those who oppose adjustments or extensions of the Park boundaries where such changes are needed to round out natural integrated biotic units.

Commercial objectives should not be permitted to jeopardize the value of lands which are primarily of importance for recreational use. In line with that belief I thank God that the powerful influences of the grazing associations failed in their efforts to force open the National Parks to grazing during the World War. On the other hand, I regret the great damage that was done to National Forest ranges by our misdirected zeal to win the war by overcrowding the ranges with cattle and sheep. After years of opportunity to contrast ungrazed mountain meadows and forests with those that have been grazed by range stock, I feel that it is wrong, in areas of high scenic and recreational value, to deprive the camper or traveler of the opportunity to see the glorious beauty and profusion of wild flowers when unspoiled by the grazing of domestic stock.

I recall that back about 1914—long before the Forest Service had designated recreation as one of its major activities—former District Forester Coert Dubois visited the Trinity National Forest in California at a time when there was some thought of selecting that area for demonstration under a development program. In talking of the benefits of such development Dubois explained to some of the prominent citizens of the area that increased development and use would naturally result in gradual restrictions in grazing privileges, grazing at that time being the principal industry on the Trinity. He cited the large number of field- and stall-fed cattle and sheep raised on the farms of the East and Middle West and suggested that eventually much of the western stock would be similarly raised instead of on National Forest ranges. That, in my judgment, is the proper solution when grazing privileges conflict with recreation in areas where the latter has become the most important use. Grazing upon areas of intensive recreational use is an abomination. Deer hunters, when buck fever is running rampant, will put up with any kind of campground—even a barren, smelly sheep corral; but who would not choose in preference, and prefer his family to enjoy, a camping site in which the vegetation had not been grazed and trampled by sheep or where they did not have to use a spring which had been mired into an unattractive mudhole by the pawing of cattle?

The fact is recognized that cut-over lands may frequently be valuable for camping purposes, either because they are conveniently located or because they furnish good hunting. However, when an area of any material size is of value primarily for recreational use other than hunting, we can well afford to keep the area in a natural condition to an extent greater than that of mere strips of unlogged timber along the road. I have no animosity toward the lumberman; far from it; I wish for him a successful business, and in accordance with that wish I am a firm believer in the principle of sustained yield in order that the lumber industries and settlements may be established on a permanent basis. While there is not at present a proper distribution of stumpage with relation to the local demands in the East and Middle West, yet the threatened timber famine for the country as a whole has not arrived. The lumber interests are having to fight to maintain their markets against the competition of substitutes, and many timber holders are desirous of having the government devise some method of relieving them of a large part of their investment in stumpage. We are therefore today in a position to give just as careful consideration

to the rights of the public for recreational use of suitable forest areas in public ownership as we do to the rights of the lumberman to cut timber in public ownership. In many cases a careful analysis would show the timber, even that of high commercial value, to be of greater value and public benefit if reserved to preserve attractive recreational surroundings.

In view of the limitation in acreage of lands to be retained exclusively for recreational and aesthetic use, as discussed in the forepart of this talk, it is hoped that no forester or lumberman will interpret these remarks in regard to reservation from cutting as applying to other than lands for which recreational use is of dominant importance.

Certainly no forester needs to have the meaning of multiple-use explained to him. It is a justifiable and recognized principle for the management of forest lands. It is highly desirable that the crop-production uses of forest lands be accompanied by recreational uses whenever and wherever possible. But to assume that every forested area would be properly utilized by applying multiple-use forestry is an unwarranted assumption. Sound land-use planning indicates that certain uses, or combinations of uses, are more suitable to certain types of areas than to certain other types, and the question of how much and what kind of forest land should be devoted exclusively to recreation must be answered in each case by the characteristics of the area and its relation to human needs. The crop-production practices of multiple-use forest management may be nothing more than a bald misuse of certain types of recreational areas, whereas the devotion of such areas exclusively to recreation may be the only intelligent and complete use of irreplaceable resources.

In conclusion, I wonder whether the ballyhoo of multiple-use for areas of high recreational character may not be a cloak to cover a greater number of uses for such areas than are justified or would be voted by the public using such areas, if they had their say.

INTEGRATING RECREATION AND AESTHETICS INTO MULTIPLE-PURPOSE FOREST MANAGEMENT[1]

By S. B. SHOW

U. S. Forest Service

HISTORICALLY, the forest park movement in America originated and derived its strength from the fact that exploitation of forest and range lands commonly—indeed typically—left desolate unsightly wastes unproductive either of commodity or beauty. Such common practices as clear cutting, with or without subsequent burning; gross overgrazing of mountain meadows, resulting in deterioration and eventual destruction; the building of reservoirs studded with drowned-out trees: such practices naturally raised the question whether exploitation was at all compatible with preservation of native beauty.

The public park movement challenged the destruction of natural resources by asserting that preservation required nonuse. The public forest—i.e., conservation—movement challenged it by asserting that utilization without destruction was possible.

The early expression of the park formula in reservation of unquestionably outstanding areas, such as Yosemite, has

[1] Paper presented for the author by T. D. Woodbury.

drawn and held the support of layman and forester alike. No discussion is required as to the public desirability of the truly unique or outstanding being in single-purpose status.

But as new roads, countless automobiles, increased leisure, and a lively curiosity have pyramided the far-flung use of forest lands for recreation, and the exclusive-use park formula has been advocated as the single or best solution of the Nation's recreation problem, numerous points and zones of sharp conflict have developed. The park formula says, "No matter what the economic values, if high recreation values are present, utilization must be foregone". The formula is a rigid one, and does not admit of elasticity.

But it is up to the foresters to meet affirmatively the charge that economic use necessarily destroys recreational attractiveness and beauty. To avoid fruitless argument over terms, we define attractiveness and beauty as those qualities which are accepted and used by people possessing freedom of choice. When large numbers elect to camp in selectively cut forests, we say that such forests are attractive and beautiful, and that the assumption that virgin forests only possess these qualities is in error. When people flock to artificial lakes, that fact proves that beauty is an attribute of the artificial as well as of the natural. The extremist definition of beauty as inhering only in the untouched and undisturbed is contrary to public judgment as expressed in use.

To further narrow the discussion, let us examine the question, "Have we, on National Forest lands, developed practical utilization techniques and methods which leave cut-over lands attractive?" In the western pine types generally, selective logging with subsequent disposal of the slash is the general rule. The pronounced trend toward flexible utilization operations based on tractor logging and truck transportation of logs clearly means that, more and more, light cutting at a given time will be the rule. That in turn means minimizing the inevitable marks of logging, always maintaining a high forest cover, and measurably holding to a level the attractiveness inherent in pine forests.

In redwood—none of which is in National Forest status—clear cutting and burning are still the common practice, but on a small scale the practicability of selective logging and spot disposal of slash have been demonstrated. The tools and methods are available to handle redwood utilization without destruction of beauty.

In Douglas fir selective logging is commonly though not invariably feasible, and the trend toward smaller, more flexible operations is removing whatever pressure has existed for wholesale clear cutting and broadcast disposal of slash.

In all these western timber types the basic methods needed to preserve a continuous forest cover (and therefore beauty) have been worked out. It is accurate to say that, though practice has not uniformly caught up with research, the trend is in the right direction. At least on public forest lands, the pressure for wholesale liquidation of the entire stand at a single cutting is decreasing.

The millenium can hardly be reached in a moment. Existing commitments made years ago will prevent to some degree the full immediate application of what is now known. But the western forest types will not have to be frozen in nonutilization to preserve their recreational attractiveness and beauty.

Development of the basic selective logging methods, with the equipment, type of operation, etc., needed to effectuate them, answers the basic question whether utilization and attractiveness are compatible. The public foresters have long recognized, however, that the challenge has many sides. One of its important aspects

is how to meet the widespread demand for preservation of roadside beauty. On forested lands the traveler generally seeks two things—the illusion that he is traveling through virgin forest, and the chance to see into the forest.

We have experimented extensively with methods to meet these legitimate demands. Screening of roads with belts of virgin forest reserved from cutting commonly is unsuccessful. Windfall and the death of overmature veterans often decrease rather than enhance the attractiveness. And in the heavier forest types, such as Douglas fir and redwood, a continuous unbroken wall of vegetation tends to be monotonous and unattractive. So the more recent ventures tend to employ selective logging to remove the largest trees containing most of the values, and thereby open up vistas into the forest, and add variety to the road. Usually a lighter cut is desirable than on the area as a whole, but if skillfully done, some cutting along most roads adds to, rather than detracts from, the attractiveness. Preservation of beauty along streams and roads and around camping areas can be generally attained by admitting light cutting. To most people a forest of vigorous growing trees is more attractive than one with snags and decadent, diseased, and misshapen trees.

In very open light stands, particularly in the pine types on poor sites, reservation of these strips from cutting may at times be desirable, but since the specially treated road, stream, and camping areas commonly make up only 5 to 10 per cent of any total forest unit, there is only the flimsiest reason for nonuse of the whole to attain preservation of a fractional part. The multiple-use principle readily admits nonutilization on small areas, if genuinely needed.

In general, as to harmonizing timber utilization with recreation and aesthetics on National Forest lands, the needed practices have been developed, the legal basis for their application exists, and both administrative authority and accepted policy recognize definitely the place for limited nonutilization or light utilization practices.

Range use must meet the same challenge as timber use, since domestic stock possess almost as high capacity to destroy as the saw and ax. The attack on grazing of domestic stock on the National Forests has centered on sheep. This, to the forester, must remain an anomaly, since sheep can be completely controlled in the way in which they use the range, whereas cattle cannot.

The key to harmonization of grazing with recreation is the fact that on most areas, and for most forms of recreation, only a small fraction of the total area is actually used for recreation. For example, we find that if cattle are permitted to enter the heavy recreation centers around mountain lakes, turmoil and conflict result. But when, by fencing, a half-mile zone is closed to stock, everyone, including the cows, is happy. In high mountain ranges, in primitive areas, sheep can be kept back by herding a relatively short distance from the trails, and recreation users are not interfered with. Exclusion of stock from the heavily used recreation areas, usually 5 to 15 per cent of the total, is technically simple, inexpensive, and effective in integrating the two uses. Multiple-use management frankly recognizes the place of nonuse or light use in range, as in timber management.

The alleged inherent conflict between domestic stock and wildlife turns out to be the prosaic matter of limiting domestic stock in order to leave feed for wild stock. Deer use ranges jointly with domestic animals if there is feed. The techniques of range management make possible ready determination of carrying capacity. The legal, administrative, and policy implements at the disposal of the Forest Service do not prevent adjustments—even to

the point of exclusion—needed to provide range for wildlife. Indeed, in the western states the fact that from 70 to 85 per cent of the total deer kill is on the National Forests shows conclusively that range management on the National Forests has measurably done the job of maintaining hunting as part of the American tradition.

The heavily overgrazed range, like the overcut forest, tends to be ugly and unattractive. Knowledge of the techniques and management practices needed to avoid both is reasonably sufficient. As application catches up, there will remain little if any real reason for nonuse as a general formula to preserve attractiveness.

In the field of water utilization, too, past practices often resulted in creating artificial lakes full of ugly dead trees, and a shore line littered with debris. The remedy under the multiple-use principle is not to prevent reservoiring—which commonly is vital to sustain western agricultural communities—but to develop and apply the technical practices to make artificial lakes beautiful. This is simple enough. Advance clearing and disposal of debris almost does it. If to that is added dam design having some of the sweep of line which in bridges and skyscrapers draws a chorus of cheers, then the problem of ugliness has been solved. Attainment is fully implemented by existing legal, policy, and administrative instruments. It should be remembered, too, that reservoiring and intensive use of water generally involve but a minor percentage of the forest land in any unit.

The multiple-use principle clearly recognizes the place of large areas devoted primarily to important recreational forms. The primitive area system on the National Forests is a case in point. Here, without excluding range use, reservoiring, or timber utilization, definite provision is made to preserve a type of outdoor recreation which was in danger of vanishing. The system has been sufficiently tested to warrant the assertion that public opinion overwhelmingly favors it, and that the Forest Service can withstand the inevitable pressure seeking to break it down.

As a general conclusion it is fair to say that modern techniques for management of timber, range, and water have largely solved the problem of attaining recreational attractiveness along with resource utilization. That full application of known methods lags is well known, but a sweeping assumption that recreational attractiveness is obtainable only through widespread single-use withdrawals is, in the present day, wholly unwarranted.

On the contrary, it is perhaps timely to examine on a factual basis the question whether the park formula, with its inherent rigidities, is even the most effective means to serve public recreational needs. We exclude from the examination the unique and the truly outstanding.

First of all, the park formula, as generally applied, excludes recreational forms, notably hunting and the enjoyment of specific areas by individuals, which are in themselves socially desirable. Hunting, in particular, is a vital part of the life of millions, and a truly democratic provision of the recreational needs of the mass can hardly ignore it. The multiple-use principle clearly and explicitly leaves room for all the socially useful recreation forms. It attempts not to thwart or alter individual habits, but to gratify them.

A second consideration is that the utilization practices developed in timber and water management, more often than not, add to rather than detract from the total of recreational values and opportunities. For example, well-done selective logging in dense forest types, by opening the stand, gives opportunity for the subordinate vegetation of grasses, weeds, and shrubs to develop as they

cannot in a fully stocked virgin forest. Not only does this add life and variety to the purely aesthetic qualities of a cut-over forest, but in more material ways it is beneficial. The subordinate vegetation affords feed for wildlife, thereby increasing the opportunities for hunting. This fact is a commonplace of European game management. So timber utilization in itself, if done on a technically sound basis, is a recreational asset rather than liability.

The construction of reservoirs, adding lakes to an otherwise lakeless mountain mass, adds enormously to the total of recreational assets. More than anything else, a lake inevitably becomes the center for the most varied type of outdoor recreation. So long as the accepted decencies in clearing and dam design are observed, artificial bodies of water—not possible under the park formula — are accepted with appreciation by the using public which both park and forest serve. And if, as commonly occurs, these centers of heavy human use mean exclusion or modification of timber or range utilization, but a small area is removed from the necessary economic processes of wood and animal production.

If to the foregoing consideration is added the fact that most of the forest and range area is already the established base for community support, the need for extreme caution in further expansion of single-use recreational areas becomes evident. A glance at the map showing the areas already cut over or burned over in the Northwest dispels any general question that there is a huge unneeded surplus of timber. From now on, most recreation will have to be on multiple-use areas.

All of this probably means that we are headed toward the situation generally found in the European countries—very widespread use of forests for recreation, but all forests under intensive utilization. This complete integration of recreation with utilization is obviously effective because the techniques of forestry preserve and perhaps enhance the native attractiveness of forest areas.

There is a long way to go before such a stage is generally reached in this country, particularly on private lands, which, not being generally managed under the multiple-use principle, hardly come within the scope of this paper. But granting readily the innumerable problems of detailed local adjustments of recreation with forest, range, and water management, and the lag in application of known practices, it should be unnecessary to labor the point that the bulk of recreation on public lands must and can be on areas subject to economic utilization. Multiple-use forestry has progressed far enough so that it is equipped to meet the challenge of maintaining attractiveness along with utilization.

DISCUSSION

Mr. C. E. Favre: I was much interested in the papers on soil conservation. We are doing a good deal of cooperative work in southern Idaho and in Utah. I have a few notes on the subject, which I will read:

The interest that is being taken in soil conservation by private citizens of the country is of real significance. For example, in southern Idaho and in Utah the municipalities, the county commissioners, and the civic clubs are all so much concerned about the serious floods and erosion, which cause much damage to life and property, that they are putting up funds of their own to buy lands on top of the mountains, where the erosion really starts in many cases. These lands have been turned over to the Forest Service for administration and intensive control activ-

ities, so as to protect valuable property and life below.

In handling our National Forests east of the Cascades, as well as much land in private and public ownership, we must not only deal with natural and artificial causes of soil depletion, but must also provide for reasonable support of dependent industries while adjustments are being made to put natural resources under management in keeping with soil and cover conservation practices.

To point out what I mean in this land-use problem, I am going to use as an example the Snake River drainage above the mouth of Salmon River. The following are some pertinent facts concerning climatic and physiographic features of the Snake River Valley, present use of it, and some of the principal problems involved in its future use:

AREA, BY USE CLASSES

Use	*Acres*
Farming	2,880,000
National Forest	23,723,000
Grazing	24,223,000
Total	50,826,000

Watershed Relationship

Practically all the irrigation water used on the above farm lands is derived from about 24,000,000 acres of forest and range lands above 6,000 feet elevation. These high watersheds receive from 25 to 50 inches of rainfall annually, as compared to only 8 to 12 inches on farm and range lands below 6,000 feet.

Based on $100 per acre value, the farm lands have a real worth of some $288,000,000 (if irrigation structures, rural improvements, machinery, etc. are considered, the value should no doubt be doubled); and since these values are dependent on the water-yielding lands above 6,000 feet for irrigation, *their* per acre value in dependent lands is some $12.

National Forests in the basin include most of the valuable watershed lands, i.e., 73 per cent of the total precipitation is accumulated on 34 per cent of the total basin area, which is all very largely within National Forests.

Timber Relationship

Approximately one million acres of the timberlands of south-central Idaho are in private ownership. The present owners of this land are in agreement with interested public agencies that such lands are an unprofitable investment for the production of timber alone. As the present virgin timber is removed, the value of the land for watershed and aesthetic purposes will be paramount. As before mentioned, the present private timberland owners, the State Planning Board, and the Forest Service are in agreement that the land should revert to public ownership as rapidly as funds made available for purchase by the state and federal government will permit.

Forest officers of the Intermountain Region are making an attempt to redeem their responsibility for the protection of watershed values. Two forest tree nurseries are now being developed—one primarily for the planting of watersheds in Utah and the other for a similar purpose in Idaho. We realize that we have a difficult task to bring about successful reforestation on many of the watersheds of the Intermountain Region. Studies are now being conducted by the branch experiment stations, the results of which we are hopeful will aid in our efforts.

Range Relationship

Practically two-thirds of the National Forest areas are used for summer grazing of some 170,000 cattle and horses and 1,500,000 sheep. The total number of livestock grazed and fed in the Snake River basin is some 400,000 cattle and 3,000,000 sheep.

MAJOR PROBLEM

Water Shortake Problem.—(a) Water supply is, and always will be, the limiting factor in irrigation development in the Snake River basin. In addition to the 2.75 million acres now under irrigation, and the 1.3 million acres of irrigable land which will be brought into production as soon as the costly irrigation works needed to get water to them can be justified, there is a considerable acreage of high-quality arable lands for which water supplies are inadequate, regardless of expenditures.

(b) Frequent water shortages are experienced on most of the tracts that are irrigated from tributary streams, although ample water for present needs is available to the one million acres that are supplied by the natural flow of Snake River supplemented by storage at Jackson Lake, American Falls, Minidoka Dam, and Milner Dam.

(c) Crop losses for the six short water years of the decade 1924-1934, inclusive, averaged over $1,000,000 per year for the Boise Project alone.

The Erosion Problem.—Slight or no erosion is occurring on 36 per cent, material erosion on 34 per cent, and severe erosion on 30 per cent of the area of the Snake River basin (in Region Four).

The Range Problem.—Of the 47 million acres of range land within the Snake River basin, approximately 20 per cent shows little or no depletion, 17 per cent shows moderate depletion, 31 per cent has been seriously depleted, and 32 per cent has been so severely depleted as to make rehabilitation an extremely difficult problem.

In conclusion: The restoration of plant cover will answer both the erosion and the range problem.

Mr. N. L. Munster: The two soil-conservation papers and the last talk suggest the thought that there has come to the fore what could be considered a new profession, of land planning. The younger foresters should realize that they must recognize and plan for all other land uses as well as timber production, so that the people who derive a living from the land will not have to move out. I believe it is going to bring forth a new profession, for those who can specialize in putting diversified uses into a coordinate whole.

Mr. Coffman: I want to express my appreciation of the excellence of Mr. Show's paper. I think it is one of the best and most convincing statements in support of National Park principles that I have heard in a long time; indeed, better than my own paper in that regard.

Show states that leaving roadside strips of virgin timber does not meet the situation. We agree one-hundred per cent. He says that the Forest Service has now developed a system of grazing which ties in with the use of recreational areas. I am very glad to know that the Forest Service in the last 8 years, since I transferred to the Park Service, has made such wonderful advancement, in contrast to what had happened in the preceding 23 years. As a matter of fact, I travelled somewhat recently in the state of Missouri, and I am still a doubting Thomas in that regard.

Show's paper devoted a good deal of attention to the areas which we both admit are properly administered under a multiple-use program. With regard to areas where the recreational and aesthetic use is preponderant, I think the meat of his paper is contained in the one paragraph in which he said:

"The multiple-use principle clearly recognizes the place of large areas devoted primarily to important recreational forms. The primitive area system on the National Forests is a case in point. Here, without excluding range use, reservoiring, or timber utilization, a definite provision is

made to preserve a type of outdoor recreation which was in danger of vanishing. The system has been sufficiently tested to warrant the assertion that public opinion overwhelmingly favors it, and that the Forest Service can withstand the inevitable pressure seeking to break it down."

Oh boy! Oh boy! I wonder on what primitive areas lumbering, special use, and grazing are intended? If that isn't the best argument for National Park principles on areas that are being reserved primarily for recreation and aesthetics, I don't know how I could state a better one. If the Forest Service has solved the problem of primitive areas and is still permitting special use, the grazing of domestic stock, and timber cutting, why, oh why, in the name of logic, was it necessary, in the recent highly publicized withdrawal of a primitive area in this part of the United States, to devote so much attention to the fact that grazing was excluded, special use was excluded, timber cutting was excluded? I can't make the two jibe.

But it seems to me that the answer is self-evident, and very simple. The area was set up just as close to National Park principles as it could be under National Forest administration. I think the conclusion is unescapable that, for areas where recreation and aesthetics are the primary consideration, the National Park principles are the best principles to apply. Q. E. D.

Mr. L. G. Hornby: We sit here in this meeting and discuss the possibilities of a vast domain which, after all, doesn't belong to us. After all, the public has a say in this matter; and I don't think the public, particularly the recreation public, has been heard from. I am speaking of the vast inarticulate majority of people, not the vociferous minority who can take a subject such as this, which has a tremendous sentimental appeal, and create such a furore and so muddy the waters that we lose track of the underlying principle.

I believe I can answer Mr. Coffman's question about primitive areas, even though I don't know what Mr. Show was talking about. I speak with respect to Oregon and Washington, where we have a definite plan on record. It is on record; it is not a matter of talk. It provides specifically in every case how a primitive area shall be used. If on one particular little corner, which is included in the primitive area for reasons of administrative boundary, the timber is to be cut, we say so. We don't camouflage. The matter is a record. If special uses are to be allowed—and I don't know of any in Region 6—it is so stated. If grazing is to be allowed, it is so stated. If grazing is to be excluded, which it is on many of the primitive areas in Oregon and Washington, we so state.

The difficulty which the land planner runs into in this matter of recreation is to evaluate properly sentimental demand. If you make a statutory classification of land, your land planning ceases right there. You have nothing further to do. In the state of Oregon we have a piece of legislation which makes the classification of agricultural land very simple. The statute states that if a "forty" has less than 300,000 board feet of timber on it, it is agricultural. That is simple. You don't have to bother with any examination, you just find out how much timber there is on it; if it has less than 300,000 feet, it is agricultural.

We have all seen the changes that have taken place in this recreational demand in the last fifteen or twenty years. The forest planner should be in a position to meet whatever economic, sentimental, or other sort of demand comes from the public properties, not the Forest Service, nor the Park Service.

Mr. Albert Hermann: As one of the

few foresters on the State Planning Commission, I may add a few words about these various bureaus that are engaged in handling our natural resources. The differences of opinion between the Park Service and the Forest Service may be eliminated when a national planning and land utilization agency begins to operate. I thought at first we weren't going to have any arguments at all in this annual meeting. I am going to call the attention of the younger men to the fact that they haven't been born too late; there are plenty of problems to solve. The differences between the Department of the Interior and the Department of Agriculture will have to be solved before we get effective utilization of our natural resources. That is going to require some planning, with an impartial study; and the Forest Service and the Park Service can't do it. Each of these papers puts its own side of the picture before you, and minimizes the other side.

As for public opinion, where is it, and what is it? In Michigan not long ago a county board of supervisors voted against the use of a certain island for a certain purpose. A day or two later I was sitting in the office of one of the large automobile industrialists in Lansing. He said, "Yesterday they voted that way, but next week they will rescind that vote." Sure enough, the next week the board of supervisors, representative of the people, changed its mind. How can we determine public opinion?

I often wonder why the millions living in the slums in the East should want large sums of money put into National Parks in the far West. They need recreational areas; they need inspiration, but they need it back home, where they can get it. It is a very small minority that ever visits the National Parks in the far West. I repeat to you younger men, those under forty, who have taken practically no part in this program, you have plenty of problems to solve, plenty of planning to do, and plenty of mistakes to unsolve.

Mr. John B. Yeon: I am in neither the Park Service nor the Forest Service; I come as a rank outsider. I have no desire to take sides on the redistribution of wealth —on removing choice land from one department to the other. But the paper by Mr. Show has filled me with a great deal of alarm. I hope he has not expressed the attitude of the Forest Service in regard to the recreational use of these lands. As I interpret his paper, I see no promise of the type of public service which I had previously expected on National Forest land; no hope of saving anything but timber strips along the highways; no chance of saving any sizable remnants of the original forest of the Northwest. Apparently we can't look to the Forest Service as the agency for conserving recreational areas. It seems to place very little recreational value on forests. The primitive areas embrace usually only the high timber-line meadows. But, while we value our mountain meadows, it seems to me that the forests of the Northwest are the most distinctive recreational features we have.

Utilizing these forests in such a way as to improve their recreational features through cutting does not appeal to me. I can see how a German forest, planted in rows of trees of uniform size, might warm the heart of a forester, but to me, as one who goes into the woods to see them as nearly as possible in their natural wild condition, the growing and the decay and the sequence of tree generations, the thought of turning all these primeval forests into forest plantations makes my blood run cold.

The objective of European forestry as a basis for timber practices in the Northwest seems to have many fallacies. Because Europe follows a procedure is no sign it is desirable for us. I have seen these forests in Germany. If Germany

had any sizable portion of such forests as we have, they would allow no cutting whatsoever in it. That kind of forest was gone in Germany centuries ago. It was gone in England when the trees were dragged out of the forest to make the fleet that sank the Spanish Armada. While we have no heritage such as Europe has of other kinds that come from their long history, one thing we can save is large portions of our forest, undisturbed, as an exhibit of the type of country which we inherited. I think unless we do that we will have missed the one American chance. We are always boasting of doing things in a big way; and this is our one unique cultural possibility, which has been lost to the rest of the world.

I don't care how these forests are saved, but the policy advocated in the Show paper, as I said before, is the most alarming thing I have yet heard on the future course of development in the Pacific Northwest. I think that while ninety per cent of the people are not aware of the very laudable economic objectives of the Forest Service, primarily they value the forest domains for their great natural landscapes. I hope what has been expounded this morning is not official.

Mr. Kuhns: Who are these recreational people? Are they from the East, or the West? As far as the National Forests are concerned, the big bulk of recreationists are local people. If so, what is their dependency on these areas? Over fifty per cent of the payrolls in Washington come from forest industries. How much comes from the livestock industry I can't say, but in some localities the people are very dependent on livestock. If we are going to have our best timber and our best range areas devoted to recreation, how are the people going to raise the money to enjoy them? It takes money to recreate.

In listening to these discussions, while I haven't been filled with alarm or terror, I have been very, very bitterly disappointed that in a convention of foresters we continually harp upon "these wonderful old trees". Have we degenerated to a sort of ancestor worship like the Chinese, that we can see no merit in anything except something that is old? The forest is a crop; it can be used and perpetuated; and I challenge anyone to say that these big trees have more beauty than a stand of young trees that has been protected from fire and insects and is producing not only scenery but a new crop, which will furnish industry money to pay to the people who want to go and enjoy these beauties.

Professor Spring: The speaker who just preceded Mr. Kuhn ought to realize that neither Mr. Coffman's nor Mr. Show's paper represents a desire to do what they propose for all the forest lands in the country one hundred per cent. A brother and a friend of mine went out to the Southwest, and stood on a mountain, and looked across at the beautiful range beyond. My brother said, "Isn't that a magnificent sight?" The other, who came from New York City, said, "Yes, but I wish I were back on Broadway". People are very different in their desires.

I think it is fine to get a statement like Show's, indicating that the utilitarian point of view modifies and we look at other aspects of the question from that which we all saw exclusively when we were very young in our profession. Another thing to remember is the need to educate people to appreciate our work as well as the features of which Mr. Coffman has so excellently told us.

When I was in France in 1927, I picked up a little book. I wanted to write one for this country. It was published by the Tourist Bureau of France, and was entitled "An Appreciation of the Forests of France". It gave a fine picture of the whole matter of forestry and forests. It didn't neglect the aesthetic viewpoint. It

described very clearly and beautifully the forests of the different Departments of France. We have just as good a thing here to interest our people in, from all aspects, including the many uses of our forests.

Mr. R. L. Fromme: I think there has been a misconception regarding Mr. Show's paper. If I understand it correctly, he stated that there are areas in the National Forests where no utilization of commercial resources should be permitted. In the National Forests in this Region we have some small areas, called natural areas, on which there is no resource utilization. They are to be held as museum areas. Also, in the Mount Baker Forest there is a very extensive primitive area, extending over into the adjoining Forest to the east. In it grazing is to be limited, and so far as I know the principles under which it is to be handled do not permit timber utilization.

In view of the recent trend towards the use of automobiles by recreationists, I wonder if we know what percentage of those who travel into National Parks or National Forests patronize the areas back from the highways. We have tried to get some figures, and they show that the actual use of such areas has decreased rather than increased. I think this is something that should be considered. The only urge to get into the back country in the summer comes from the mountaineers or the Boy Scouts, and in the fall from the hunters.

Mr. A. G. Jackson: I'd like to ask Mr. Coffman what constitutes a complete biotic unit?

Mr. Coffman: I would say, a unit in interrelationship of plant and animal life. It should also be a feasible unit for administration.

Mr. J. F. Kittredge: This is one of those subjects, like the one with which I am more particularly concerned, forestry and streamflow, in which there seems to be violent generalization on both sides. I think there is a certain similarity in the two situations. Both subjects are, as a matter of fact, extremely complex; and as Mr. Coffman pointed out, they really become questions of individual areas. Each piece of country is a problem in itself. You can't find the answer by generalizing. You don't have to bottle up all the forested country for recreation, neither do you have to use it all for utilization.

I read Show's paper quite carefully before the meeting. I think it brings out some very interesting possibilities. The big point is that the techniques of timber management, range management, watershed management have been developed to a degree that permits conflicts between recreation and aesthetic use and utilization to be reconciled. Some people won't agree with that; and Show definitely excludes from his discussion areas of outstanding scenic features, like those now in the National Parks. I am sure he would also exclude areas which are set aside for the purpose of preserving natural primitive conditions. There, perhaps, comes in a question of definition, or of the particular considerations involved with respect to specific areas. If you want to interpret primitive as areas where primitive conditions are wholly undisturbed, then no utilization is permissible. If you interpret the term in another way, certain degrees of utilization can be considered permissible.

Most people who go into the woods for recreation stay very close to the roads, in camp grounds, on the streams and lakes. Very few get back half a mile or a mile. On these lands back from the areas of intensive recreational use, I am inclined to think you can practice utilization without any measurable interference. But on the lands closer to intensive recreational-use areas, I would not agree with

Show that selective logging offers a satisfactory way to apply multiple use. If you are going to have utilization of the timber in those situations, we have got to go a lot further than selective logging goes, or the forester has ever thought of, into the technique of cutting for aesthetic effects.

This is practically an untouched field—how to create additional beauty by the way you cut the timber. It involves a field of aesthetics and art of which very few of us have much conception. But if we are going to practice utilization near areas of intensive recreational use, I think that must be the line of development. It isn't enough to say that selective logging will give us a desirable aesthetic result; we must go further than selective logging, and develop the aesthetic purpose and practice, so that our cuttings don't simply utilize some of the timber but are done primarily to put the area in the most attractive form for recreational use.

Recreational use, whatever we may think of it, is already big, is growing tremendously, and is going to continue to grow. It can be a very strong influence for the support of forest policy generally. Can we afford not to do anything we can to obtain that support, to encourage rather than to run the risk of antagonizing by half-way measures? I happened to be in Minnesota at a time when a large part of the Superior National Forest came very near being completely closed to utilization because there had been cases of unwise utilization in some portions. The opposition became extremely strong, and very nearly bottled up the whole Forest. That is frequently a possibility. If we can get cooperation and support by constructive measures, as I think it is possible to do, by going much further with the development of aesthetic forestry technique than we have hitherto gone, we have a chance of accomplishing something substantial.

Show makes the point that application of the technique of timber management is lagging behind the actually available technique. I think that applies primarily to lands close to the areas of intensive recreational use. I wonder if there is a sufficient excuse for letting application of our knowledge lag behind, in those situations. Isn't it extremely important to use all the knowledge we have, to reconcile conflicting uses on areas valuable for recreational purposes?

Mr. Woodbury: One of Mr. Show's main points was that a live, growing, young forest is just as beautiful to a large class of people as an old deteriorating forest. I think as foresters we should make an effort to put over that idea. I myself think a young forest, properly cut, is a thing of beauty; and I think we have many instances in the National Forests where that can be proven.

I am rather disturbed by the tendency that I have seen growing up in California for people who favor the park idea to promote sentiment in favor of taking into parks lands which, as I see them, are not park lands, but just forest lands. The acquisition that Mr. Coffman spoke of on the western border of the Yosemite National Park is open to argument. The primitive area of Yosemite is very largely in that class, although serving as a buffer zone around the Park. As for primitive areas generally, I think what Show meant is that we are going to exclude roads from them for the present, and they are going to be primitive for a long time, but their ultimate use will be dependent to a large extent upon factors not now clear.

Chairman Graves: Although I am Chairman, I want to say one or two things. I have seen the public forest system and the public park system grow up side by side, each with its own problems. Those who are not familiar with the development of the two types of reservations and the motives that brought each into existence should take time to study them.

There is danger in matters of this kind when we approach objectives from different viewpoints. Where particular areas are concerned, there are cases where conflicts of the purposes of different people appear. We should study the background of the recreation problem, and study the social problems which give rise to it. I think I never obtained a full appreciation of some of these problems until I was in charge of the New Haven municipal park system, and found I obtained a much better understanding of recreation problems when I was President of the Community Chest and learned about the real social problems of our city, which called for the kind of services we have been trying to render in our municipal parks.

I think there are some things that have not been brought out here today in regard to the attitude of people toward the National Forest system when it comes into apparent conflict with National Park purposes. Many fear that perhaps the ability may be lost to meet future public needs under conditions which we cannot foresee today. Often differences in points of view between the Park Service and the Forest Service come from the fact that we may not know what future conditions will be, and what the new problems arising from changed conditions may require. Someone spoke here of the danger of freezing up lands from utilization of the resources. But many people fear that perhaps lands will be frozen up through commitments to commercial activities and thereby prevent a National Park type of administration, because we failed to think far enough ahead. Oftentimes fear of that kind finds expression not so much in differences of opinion on fundamentals as in criticism, due to questions of jurisdiction. For that reason I don't feel quite satisfied with the results of this debate.

The only message I have is that all of us have got to study a little bit further what, on the one hand, the Forest Service has in mind, the conditions they are looking forward to, and the things they want to achieve, and on the other hand what the Park Service looks forward to. I think the debate today shows there has not been a sufficient and mutual study of that kind. I should hate to have an interpretation placed on Mr. Show's paper that it represents all that he has in mind, or the full story. I feel that would be wrong, I am just expressing my own feeling that we have got to go a little bit further, not in this debate here but in mutual study of the work we have to do, to be sure we have not overlooked some things that would help us a lot toward reconciling some of the apparent differences, and would make possible at least a better mutual understanding of the underlying problems.

Mr. Coffman, do you want to say anything more?

Mr. Coffman: Nothing further except to express my appreciation of the way you have presented the problem in your summary. I was terribly sorry to see last spring, in the *Forestry News Digest,* a statement which at least was not helping to solve the situation, to the effect that there is a wall of enmity between the two organizations, the National Park Service and the Forest Service. Shucks, I don't think we have to get mad at each other just because we discuss these things. This has been a lot of fun to me. If anybody ought to be on the defensive in this outfit, I imagine I should be; but can't we consider these things calmly and in a friendly way and work out our mutual problems in a common-sense fashion, meeting around a table and trying to get the other fellow's point of view? I don't agree with Mr. Pack that there is a wall of enmity between the two organizations, and I hope you fellows don't.

Mr. E. J. Hanzlik: I think this Park

Service and Forest Service problem could have been avoided if the two had gone ahead on a basis of planning, such as is being done in a good many cases now by our regional and state planning boards. There is no reason at all why the two organizations can't get together and work out common plans for Parks and Forests. Mr. Coffman says this has been a lot of fun to him. I say it has not been a lot of fun to me. We have a situation on the Olympics Peninsula that has cost the people, not us, but the people, a lot of money. I don't know how much. The Park Service paid a lot, and the Forest Service paid a lot; and all the while the set-up has been such that there has been no concerted planning. The first thing we hear, somebody introduces a bill. The Forest Service was not consulted; probably we shouldn't have been. The planning commission was not consulted. We have regional and state planning councils. Another bill is going to be presented. I presume it is going to cost the tax-payers a lot more money. I think it is time that the Forest Service and the Park Service got together and came to some mutual agreement.

Chairman Graves: Unless there is objection the Game Policy Committee Report will not be read, as Mr. Leopold is not here, but will be made part of the record of our proceedings.

Mr. Martin, may I turn the meeting back to you?

Mr. Herbert A. Smith: I wish to offer the following resolution:

Be It Resolved, by the 500 foresters assembled at Portland, Oregon, for the annual meeting of the Society of American Foresters, that we wish to express our sincere appreciation to the officers and members of the Columbia River Section, and especially to Thornton T. Munger, Chairman of the Program Committee, and Julius Kummel, Chairman of the Committee on Local Arrangements, and their many assistants, including the cooperation rendered by the Puget Sound and California Sections, and to the management of the Multnomah Hotel, as jointly responsible for the success of a meeting which has been thoroughly enjoyed by all those in attendance.

The resolution was adopted by a unanimous vote.

Chairman Martin: Gentlemen, we have reached the end of these sessions. I am sure most of you feel, as I do, regret that we haven't more time. We welcomed you all here because we felt we needed a new viewpoint, from other parts of the country. We have taken up a number of very vital subjects. The first was, Who should own the forests of the Pacific Slope? We all know the people own the forests of the Pacific Slopes, either individually or through their own agencies.

From that we went to sustained yield. There hasn't been a man in the meeting who doesn't want sustained yield. What we sought to get at is the best approach to bring about that desirable condition in our western forests as rapidly as possible, along the best practical lines.

We have also discussed future demands as a guide to management; and have gone into other technical questions. The thing that strikes me is that, in all our discussions, there has been room for all views. What we really have been seeking is to find out whether we can't finally reach a balance of views and methods that will give the best result for the public.

I am awfully glad you have come, and I hope you have enjoyed yourselves, as we have enjoyed having you. I am very sorry to bring this meeting to a close.

The session then adjourned, terminating the Thirty-Sixth Annual Meeting of the Society of American Foresters.

Scope.—The early efforts of the Committee envisaged the preparation of a report so comprehensive and farseeing as to furnish, for some years to come, a groove down which policy actions might profitably run.

The last two years, however, have brought increasing confusion of thought to the entire conservation field. An intellectual revolution seems to be in process, the net effect of which is to vastly expand both the importance and the difficulty of the conservation idea. During this process it is difficult to see far ahead. At any rate, it is difficult for us.

This report, then, is in no sense comprehensive. It is rather a collection of fragments of policy suggested by current events. It supplements the preliminary report published in the JOURNAL of March 1935.

The Complexity of Multiple Use.—One mistake, probably made by us as individuals as often as by others, is the notion that coordination of land uses is easy. In the enthusiasm of trying to get both game management and silviculture started, both professions have adopted the uncritical assumption that they fit beautifully together.

They do fit beautifully, but not always easily. Nor can the fitting be accomplished without mutual concessions. It should occasion no surprise when the hiring of a game technician to argue wildlife interests with the timber-stand improvement crew raises more questions than it answers. Fitting uses is inherently a complex and difficult job, and can be accomplished only in the course of time. Exactly analogous difficulties and delays are being experienced in fitting together the sciences underlying land uses (14).

Such game-forestry frictions (15) as those arising out of the silvicultural operations of the C.C.C. are, in this light, the inevitable penalty of abnormally rapid expansion.

It seems to us of chief importance at this time:

1. To ascertain through surveys and study the facts necessary to a determination of the kind and quantity of services the land should render.

2. To persist in the effort to fit, despite the fact that the job has proven to be difficult.

3. To expand the local researches, especially in food habits, which must form the basis for a good job. Some examples (4, 9, 11, 13) of such researches appear in the bibliography.

Game versus Wildlife.—Foresters have usually avoided, in thought and word, the sportsman's error of assigning to nongame wildlife a lesser value than to the killable species. In action, however, nonkillable wildlife has been consistently neglected by all. It is hard to find instances in which the new and powerful tools now available have been deliberately employed in the interest of nongame, rare, or threatened species, either by foresters or by anyone else.

For example: It is now common to employ land exchange, land purchase, relocation of settlers, stock exclusions, wilderness areas, life-history research, continuous census, and administrative treaties in the interest of elk or ducks. But how often have these new tools been employed in the interest of such forest species as the grizzly bear? the desert sheep? the Mearns quail? the California condor? the ivory-bill woodpecker? the spruce hen? the fisher, otter, marten, and wolverine?

This is an important hiatus in forest game policy (6, 7). It presents an attractive opportunity for the forest administra-

tor to assume a positive role as custodian of these national resources. Some promising beginnings have been made during the past year, but the bulk of the field remains untouched.

Philosophy of Public Access.—This Committee feels deeply disturbed about what seems to it an erroneous premise underlying the current philosophy of recreational use.

It is commonly assumed that where the public pays for the administration of public lands, it is necessary to give the public unconditional and even effortless access to each and every recreational feature on such land.

We submit that no public library or public museum gives unconditional access to the rarer and more perishable of its books, papers, or specimens. It recognizes that preservation is in some cases an even higher public obligation than use. It holds its technicians responsible for knowing more than the public knows about the values and perishability of the objects in its care, and it holds its technicians responsible for building a policy of public use in accordance with such superior knowledge.

The fallacy of unconditional access to rare or perishable features has of course been partially recognized in the case of official wilderness areas, but the principle extends much further. The whole current tendency to measure recreational service in terms of thousands of users and ease of use is, in our view, a dangerous one. There must be brought into the picture three equally important but opposing principles, namely:

(1) Letting the user *earn* his recreation by virtue of some degree of mental or physical work.

(2) Recognizing the biological limit beyond which mass use destroys either the quality or the productivity of the resource.

(3) Recognizing that the responsibility for *preservation* is on the administrator, and that exhorting the public to be decent does not absolve him of responsibility for damage done.

Stated in another way, there is an absentee public, including not only those who do not use public properties but also those yet unborn, whose tastes and preferences may differ from those of the user. This absentee public has a property right in national resources equal to that of the user.

The ramifications of this question in public forests and parks policy have been recently discussed, directly or by implication, by Wright and Thompson (16), Marshall (8), Smith (12), and Clark (3).

Game Jurisdiction and Land Ownership.—On the National Forests, on the public domain, and to a partial degree on state migratory bird refuges, we have game under one jurisdiction occupying public land administered by another. Mutual confusions and delays are increasingly common on such areas.

The only basic remedy so far proposed is to cede jurisdiction over the game to the land-owning agency. In some states, however, the federal lands are so extensive that such a policy might ultimately weaken state game administration, and thus leave outside game virtually unmanaged.

A newer and perhaps sounder remedy may lie in delegating responsibility for details of management to the land-owning agency, without changing ownership or jurisdiction, in much the same manner as states now delegate to private landowners certain authority over game on licensed shooting preserves.

On a shooting preserve the state delegates to the licensee the task of producing game on his land, and also of limiting his own kill by means of tags. The latter is in lieu of the state's usual attempt to do the same thing by season and bag

limits. The renewal of the license is contingent upon satisfactory performance of the delegated task, as determined by periodic reports and inspections. The net result is that the licensee is given an incentive to do constructive work, in exchange for unusual privileges, and without any actual transfer of ownership or of ultimate responsibility.

What prevents the extension of this same principle to public landowners who now have no authority over their own game, and who are now impeded in their efforts to do constructive work by the delays incident to cooperative effort?

The proposal is, of course, at this stage a theoretical one, but one possibly worth serious discussion and a local try-out. Many important details, such as allocation of revenues and costs, are not here discussed.

Ratio of Research to Operations.—It was pointed out in the first report that the then prevailing ratio between public outlays for game-management operations and outlays for game-management research was probably 100:1 or greater.

During the past year the public outlay for game research has grown by nearly $100,000, but game operations have probably increased in equal proportion.

It would be conservative to estimate that half of the operations expenditures were used up in flounderings due primarily to lack of facts and lack of trained, experienced men to apply them.

If so, then the diversion of funds from operations to research would, up to the point that research agencies know how to use them, be profitable.

What bureaus and departments are aware of this fact? Of those aware of it, how many have disclosed it to their appropriations committees? The continued acceptance of appropriations for enterprises popular with legislators but otherwise unimportant, to the detriment or neglect of sounder and more urgent work, has emerged as a real problem in professional ethics.

The outlines of a national wildlife research program are now, for the first time, available in print (1).

Penalties of Overstocking: Mammals versus Birds.—The current year has seen the emergence of a biological principle, perhaps long realized, but not previously asserted as a positive and generalized rule for guidance in wildlife administration. It is this: overstocking range with game birds carries no invariable penalty in loss of future carrying capacity, but overstocking range with browsing mammals does. Hence greater administrative caution in avoiding overstocking is called for in the latter case.

The reasons are of course evident: seed-eating birds seldom destroy next year's crop of food-plants because there is usually an excess of seed, and often a reserve in soil-storage; browsing mammals, on the other hand, may readily destroy their future food supply because they usually weaken the palatable species, inhibit their reproduction, and thus allow usurpation of the soil by nonpalatable species.

Whether or not biologists have been guided by this rule, it is certain the public knows nothing of it. The public clamor for winter feeding or predator control on an overstocked deer range is just as insistent, sincere, and uncritical as on an understocked quail, turkey, or pheasant range.

A transfer of emphasis is needed from "more game" to "more carrying capacity" (15).

Game on Public Domain.—One of the least known assets of the approximately 162,188,000 acres of the unalloted and unappropriated public lands is the wildlife which exists or might exist upon it. Happily an able and up-to-date analysis of the condition of the western range, in-

cluding the public domain and its wildlife, is now available (2).

The public domain is in worse condition than any other part of the western range (namely, 67 per cent depleted, 95 per cent still depreciating, 2 per cent improving). It is suggested that other forms of use than livestock grazing must be found for much of it. Some of the most interesting and valuable species of wildlife are found, in part, on the public domain. These include antelope, desert mule deer, peccary, various forms of bighorn sheep, Gambel quail, sage hen, Mearns quail, scaled quail, mountain lion, coyote, ringtailed cat, badger, and desert fox, also such interesting reptiles as chuckwalla and gila monster.

Why not apply the "simple naturalistic method" of leaving a large part of this land to game, recreational, wilderness, and watershed uses? Note the following authoritative statement: "Before white settlement, the range was used only by game, the great numbers of which are attested by the reports of all the early explorers. Despite these numbers and climatic cycles, and drought periods which were undoubtedly as severe as any of recent years, the range did maintain itself, except for natural variation and for localized and temporary overgrazing, and would have continued to do so if the white man had not upset its natural and fairly stable equilibrium. Truly, man has shown less wisdom and vision in the use of the range resource than did uncontrolled nature. His greatest achievement seems to have been the removal of the natural checks and balances which had maintained the virgin range over thousands of years." (The Western Range, 1936, p. 8).

It seems to the Committee that, to save something from the wreck of this vast area, there must be a swift and effective reduction of livestock to a point where the range can begin to improve. This alone would bring about a fundamental benefit to its remaining wildlife. Steady improvement of the range and a considerable quantity of wildlife will go together.

An inventory of the resources of the public domain should be made. A scientific land classification will show much of it good for naught but wildlife. Common sense dictates that a large part of these lands be set aside for wildlife purposes.

Current Literature on Policy Questions

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ENTERTAINMENT AT ANNUAL MEETING

THE banquet was held on Tuesday evening, December 15, in the largest room in the Multnomah Hotel. The room was entirely filled with the 275 members and guests who attended. The ladies were given a separate entertainment. George W. Peavy, President of Oregon State College, was toastmaster, but confined his functions to the introduction by name of the Council members, Chairmen of Sections, and distinguished guests present. Five Section Chairmen were present. After an excellent repast, enlivened by enthusiastic singing, the features of the evening were a display of films by William L. Finley of the American Nature Association, and two "gridiron dinner" skits, prepared respectively by the Columbia River and Puget Sound Sections; which were well received and fully up to the best standards of fun and satire to be looked for from a professional organization.

The casts and settings are shown below.

Over seventy ladies attended a luncheon and informal musicale on Monday, December 14, at the Waverly Club, at which Mrs. Clyde Martin and Mrs. Walker Tilley rendered the selections; an equal number were present at the "No Host" dinner, followed by cards, Tuesday evening at the Benson Hotel.

Skit: "Where do we go from here, or a glimpse into the future." Illustrating what may happen if the Society keeps up with the modern political tendencies. Presented by the Columbia River Section.

Dramatis Personae

Most High Chancellor and Forest Fuehrer, H. H. Scrappie.
Minister of Forest Propaganda and Public Enlightenment, J. P. Goodtree.
Adjutant and Revolving Secretary, ANT Sinpants.
The Council of Twelve Apostles (only half there).
Scene: A council meeting at Central Headquarters of the American Green Shirts, New Haven, Conn., in the year 1946.
Dialogue by Aristophanes. Costumes by Fechheimer.

Skit: "The Court of Olympus." A thoroughly biased inquiry into the Olympus National Park question. Presented by the Puget Sound Section.

Dramatis Personae

Judge Outs, John C. Kuhns.
Judge Pollen, W. G. Weigle.
Douglas A. Bees, a forester from the Plains, W. H. Meyer.
Heinie Morgan, a fancy forester, R. L. Fromme.
Nat. Parkes, a vocal forester, E. J. Hanzlik.
U. P. Wright, a plain forester, John B. Woods.
Hi Lead, a logger (A. F. of L.), Paul H. Logan.
Scene: A court room.

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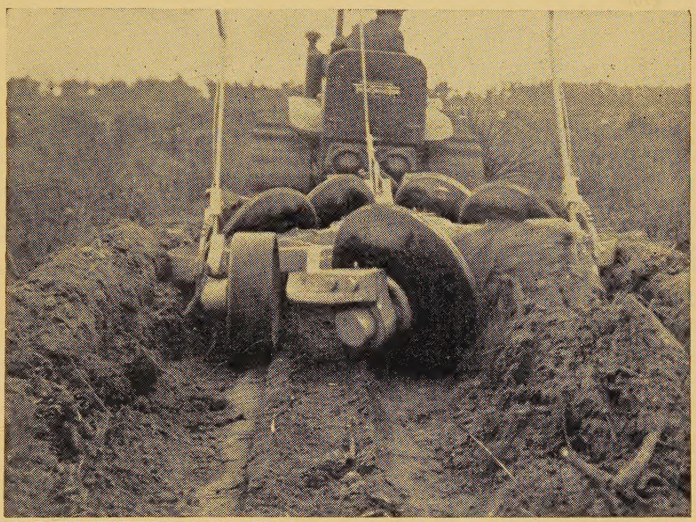

(Above) Hester 5-Disc "25" cutting fire line at Slash Pine Festival, Waycross, Georgia, November, 1936. (Left) Hester 3-Disc "20" pulled by 14 h.p. drawbar pull round wheel tractor cutting lines with effective width of 5 to 6 feet on timber tract at Douglas, Georgia, December, 1936.

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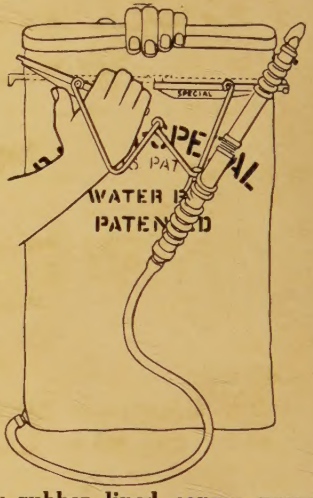

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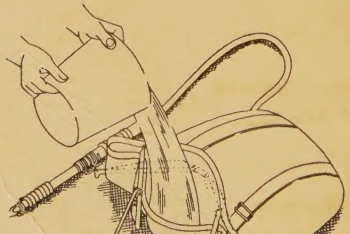

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